

Influences on cycling to school among teenagers:
An investigation using the theory of planned
behaviour and the prototype willingness model in
Christchurch, New Zealand

A thesis submitted in partial fulfilment of the requirements for the
Degree of Doctor of Philosophy in Geography
at the University of Canterbury
by Jillian M. Frater
University of Canterbury
2015

Acknowledgements

My PhD journey has involved over 14,000 earthquakes, cycling the 24km round trip each day to the University of Canterbury and returning home in time to be there for my children after school. I read many an academic paper at swimming and music lessons. Just three weeks after I started in February 2011, a 6.3 magnitude earthquake shook our office and the rest of Christchurch – 185 died, many were injured and our building was off limits for three months. Luckily this, and a subsequent earthquake of the same magnitude in June 2011, didn't significantly impede my PhD journey. I even enjoyed it when our department was 'decanted' from our building for earthquake repairs and I shared a room with 12 of my fellow PhD students – I got to know them a whole lot better than I had before.

My journey wouldn't have been possible without the support and encouragement of many people. Even before enrolling, a friend, Associate Professor Bronwyn Hayward, inspired me to start during our stay with her and her family in Reigate in the UK. Many other people also helped me figure out my research topic, which could have included a range of topics including town planning, planning policy, walking or transport more broadly. In the end, cycling and teenagers won.

I was lucky to have the guidance of three enthusiastic supervisors, Professor Simon Kingham and Associate Professor David Conradson from the Geography Department, and Dr Roeline Kuijer from Psychology. Thank you Simon, for always being there, for being a champion of cycling and for always having an open door. David, thank you for your on-going support, and careful attention to detail, and Roeline, for your expert contribution on the psychology-related aspects my thesis.

Many thanks also to the Boards of the seven Christchurch high schools who allowed their staff and students to participate, the teachers who distributed surveys to their students and participated in interviews, and of course the wonderful students who filled in the survey and who took part in my focus groups. In addition, I would like to thank Sally Buglass who coordinated the two focus groups I held in Voorschoten in the Hague Region of the Netherlands and provided me with accommodation, yummy meals and generally was amazing. Thank you also to John, Sally's husband, and their sons, David and Andrew for their help and support, and the boys' classmates who participated enthusiastically in the focus groups.

I would also like to acknowledge the Claude McCarthy Fellowship I received that enabled me to travel to the Netherlands, in addition to attending the Velo-city Global 2014 Conference in Vienna, Austria. In addition, grants and scholarships from the Canterbury Branch of the Royal Society of New Zealand, the Department of Geography PhD Conference Funding Grant, the Geography Students Conference Fund and the Precourt Energy Efficiency Center Student Fellowship allowed me to attend various conferences throughout my PhD.

Many other people have also contributed to the completion of my PhD. My friend, Dr Karen Johnson, valiantly agreed to help edit and proofread the final product. Two other groups that have helped with my work have been our long-standing writing group and our more recently created reading group. Thank you particularly to Helen, Alison, Karen, Rita, Hamish, Su-Young, Kerry, George, Niamh, Jo, Claire and Collette from the writing group and to Dr Kelly Dombroski for initiating the reading group which included many of my fellow PhD colleagues. The collegiality these two groups created helped my PhD journey to be less long and lonely. I must also thank George Williams for his collaboration on the school survey and Jane Pearce for her on-going support through difficult times for her.

Finally, I would like to of course thank my ever-caring partner Fraser and my wonderful children, Max and Finn. They have always supported me and allowed me to go to various conferences, stay late for meetings and attend talks when I needed to. The boys were both at primary school when I started, but are now the age of my focus group participants. I'm pleased I achieved my goal of finishing before they reached university.

Abstract

In New Zealand few teenagers cycle to school and the percentage of teenagers cycling to school has dropped greatly since the 1990s. This research investigates why more teenagers do not cycle to school in Christchurch, New Zealand. Specifically it aims to identify: 1) the nature of teenagers' cycling behaviour in Christchurch; 2) the key barriers to teenagers cycling to school; and 3) whether theories of behaviour change are useful in predicting cycling to school by teenagers.

The research uses the results of interviews with staff, and focus groups and surveys with students at seven high schools in Christchurch, New Zealand. Focus groups with students at a British international high school in Voorschoten in the Hague Region of the Netherlands also enabled comparison of whether teenagers who had grown up in places where few teenagers cycled to school (such as the UK) were influenced by different factors when they moved to places like the Netherlands where almost everyone cycles.

Perceived social pressure by friends had the greatest influence over whether or not students intended to cycle to school, closely followed by perceived social pressure by parents. Both of these factors are classified in the literature as 'subjective norms'. Analysis also showed additional factors concerning the individual and the behavioural setting also influenced teenagers' decisions to cycle to school. The comparative study showed students who had grown up in places where few people cycled changed their behaviour and cycled to school when they moved to places where lots of people cycled, due to the influence of norms.

Teenagers who cycled the least were girls, older students and students from lower socio-economic areas. Therefore, to be effective, any programmes to increase cycling to school would need to be targeted in recognition of the differences between these groups. After all, a thirteen year-old teenage boy is quite different to an eighteen year-old girl.

To increase the number of teenagers cycling to school in Christchurch, the most important thing required is change to societal attitudes and norms in favour of cycling. In addition, a range of practical initiatives such as improved infrastructure and cycle skills programmes are recommended. Overall what is required is change at multiple levels, targeting individuals, social environments, physical environments, and policies. Change will never be achieved by tinkering around the edges.

Table of Contents

Acknowledgements.....	iii
Abstract.....	v
Table of Contents.....	vi
List of Figures	xi
List of Tables	xiii
Abbreviations	xv
Chapter 1: Why research cycling to school by teenagers?	1
1.1 Introduction.....	1
1.2 Problem statement	1
1.3 Approach and contribution	2
1.4 Definitions	4
1.5 Thesis Structure.....	5
Chapter 2: Global Transport Issues.....	6
2.1 Introduction.....	6
2.2 Transportation Trends.....	6
2.2.1 Transportation trends of adults	6
2.2.2 Transportation trends of children	14
2.3 Climate change.....	15
2.4 Health	16
2.4.1 Physical activity.....	16
2.4.2 Air pollution	19
2.4.3 Road traffic accidents	20
2.5 Congestion.....	21
2.6 Children's rights and social capital	21
2.7 Conclusions.....	23
Chapter 3: Determinants of intention to cycle to school	24
3.1 Introduction.....	24
3.2 Intrapersonal factors.....	28
3.2.1 Age and cycling rates	28
3.2.2 Gender and cycling rates	29

3.2.3 Ethnicity	32
3.2.4 Socioeconomic Status	33
3.2.5 Peers	35
3.2.6 Parents	37
3.4 Behaviour setting	41
3.4.1 Distance	42
3.4.2 Safety	43
3.4.3 Urban form	47
3.4.4 Route continuity and connectivity	48
3.4.5 Natural Environment	49
3.4.6 School selection and location	50
3.4.7 Media	51
3.4.8 Additional factors	53
3.4.9 Transport cultures	54
3.4.10 The wider transport policy environment	56
3.5 Conclusions	56
Chapter 4: Theoretical drivers of the choice to cycle to school	58
4.1 Introduction	58
4.2 The modelling of behaviour change	58
4.2.1 The Theory of Planned Behaviour	60
4.2.2 Social Identity Theory, the Theory of Interpersonal Behaviour and the Transtheoretical Model	62
4.2.3 The Prototype/willingness model	63
4.2.4 Combined use of the Theory of Planned Behaviour and the Prototype/willingness model	67
4.3 Summary	67
Chapter 5: Methods	68
5.1 Introduction	68
5.2 Ethics and permission	69
5.3 Christchurch research	70
5.3.1 Guidelines and permissions	70
5.3.2 School survey	71

5.3.3 Focus Groups	78
5.3.4 Staff Interviews	90
5.4 Voorschoten	92
5.4.1 Location and characteristics	92
5.4.2 Focus Groups	92
Chapter 6: Cycling to High School in Christchurch, New Zealand	96
6.1 Characteristics of the subject schools	96
6.2 Extent of school participation in this research	101
6.3 Data management.....	103
6.4 How students got to school	107
6.5 Correlations between variables of the TPB and PWM.....	115
6.6 Results of the hierarchical regression analysis	115
6.7 Results of surveys, focus groups and staff interviews using variables of the TPB and PWM as a framework.....	120
6.7.1 Intrapersonal factors	120
6.7.2 Behaviour setting.....	150
6.7.3 The combination of factors	162
Chapter 7: Cycling to High School in Voorschoten, the Hague Region of the Netherlands ..	164
7.1 Background information about the school and students in focus groups.....	164
7.2 Results with respect to variables of the TPB and PWM.....	165
7.2.1 Gender, year group and socio-economic status.....	165
7.2.2 Intrapersonal factors	165
7.2.3 Behaviour Settings.....	176
Chapter 8: Key findings, recommendations, further research and limitations	181
8.1 Introduction.....	181
8.2 The nature of cycling to school by teenagers in Christchurch	181
8.3 The predictive validity of the TPB and PWM	182
8.4 Which variables of the TPB and PWM that have the greatest influence over intention and behaviour?.....	183
8.5 The influence of intrapersonal factors and behavioural settings in Christchurch.....	184
8.5.1 Intrapersonal factors	185
8.5.2 Behaviour setting.....	190

8.5.3 The combination of factors	196
8.6 Comparing teenage cycling in locations with high and low cycling rates.....	197
8.6.1 Intrapersonal factors	198
8.6.2 Behaviour setting.....	200
8.7 Study Limitations.....	203
8.8 Summary of key findings, recommendations and further research	205
8.8.1 Conclusions regarding the principle research objectives of this thesis	205
8.8.2 Key influences on student cycling rates in Christchurch	206
8.8.3 Key influences on student cycling rates in Voorschoten.....	208
8.8.4 Further research	209
8.8.5 Wider recommendations.....	210
Appendices.....	212
Appendix A: Human Ethics Committee application, additional information, amendment and approvals.....	213
Appendix B: Request letter sent to schools.....	234
Appendix C: Information sheet for teachers in Christchurch	236
Appendix D: Information sheet for focus groups in Christchurch	238
Appendix E: Information sheet for focus groups in Voorschoten	240
Appendix F: Information sheet for parents in Christchurch	242
Appendix G: Information sheet for parents in Voorschoten	244
Appendix H: Consent form for Board of Trustees of Schools in Christchurch	246
Appendix I: Consent form for teachers in Christchurch	247
Appendix J: Assent form for students in Christchurch	248
Appendix K: Assent form for students in Voorschoten	249
Appendix L: Consent form for parents in Voorschoten	250
Appendix M: Interview questions for teachers in Christchurch	251
Appendix N: Survey.....	253
Appendix O: Cycle trails - Leidschendam to Voorborg	267
Appendix P: Cycle trails connecting Voorschoten to the neighbouring towns of Wassenaar and Leidschendam.	268
Appendix Q: Other cycle trails in the vicinity of The British School in The Netherlands.....	269
Appendix R: Images shown to students in focus groups.	270

References	277
------------------	-----

List of Figures

Figure 1: International Vehicle Travel Trends (Litman, 2015)	7
Figure 2: Typical Mode Share Trends (Litman, 2015)	8
Figure 3: Typical Travel Growth Trends (Litman, 2008).....	8
Figure 4: Percentage of trips taken by automobile, walking, bicycling, and public transit in countries of Europe, North America, and Australia. Note: Walk and bike trips combined for Spain. Work trips only were recorded for Spain, Australia and Canada (Bassett et al., 2008). 9	
Figure 5: Trends in hours travelled per person per year, by mode (ages 5 and over) (Ministry of Transport, 2015).	10
Figure 6: Proportion of people cycling to work on census day in 2001, 2006 and 2013 in New Zealand by year group (Statistics New Zealand, 2014a)	12
Figure 7: Proportion of people cycling to work on census day in 2013 in New Zealand by age and gender (Statistics New Zealand, 2014a).....	13
Figure 8: Travel to school – journeys per person – ages 13–17 (Ministry of Transport, 2015)	15
Figure 9: Obesity (BMI ≥ 30 kg m ⁻²) prevalence and rates of active transportation (defined as the combined percentage of trips taken by walking, bicycling, and public transit) in countries of Europe, North America, and Australia (Bassett et al., 2008).	18
Figure 10: Ecological Model of Cycling for Transport to School (Adapted from the Ecological Model of Four Domains of Active Living (Sallis et al., 2006))	27
Figure 11: Advertisement from Motor Accident Commission and Government of South Australia.....	52
Figure 12: The Theory of Planned Behaviour (Ajzen, 1991)	61
Figure 13: The Prototype Willingness Model (Gibbons, Gerrard, Lane, Suls, and Wallston (2003)).....	65
Figure 14: Location of study schools in Christchurch, school zone boundaries and 2013 Deprivation Index by Census Area Unit (CAU) (Note: No school zones exist for Linwood College, Hillmorton High School or Aranui High School).	97
Figure 15: Proportion of students who cycled to school by year and gender	107
Figure 16: Reasons given by non-cyclists for not cycling to school in Christchurch.....	112

Figure 17: Reasons given by non-cyclists for not cycling to school in Christchurch by gender	113
Figure 18: Reasons given by non-cyclists for not cycling to school in Christchurch by year	113
Figure 19: Girl in car.....	160
Figure 20: Boy in car	179
Figure 21: Girl in car.....	179

List of Tables

Table 1: Questions asked in focus groups and their justification	84
Table 2: General school characteristics	98
Table 3: School Characteristics re uniform, cycle clubs and transport issues	100
Table 4: School participation (N=792)	102
Table 5: Total number of surveys by school for those students living more than 1km and less than 4km from their school (N=331)	104
Table 6: Survey respondents (N=331)	105
Table 7: Distance to school for all students, and those who walk, cycle and travel by car. (Note: this only includes students who live more than 1km and less than 4km from school.)	106
Table 8: How students usually got to school in Christchurch	108
Table 9: Proportion of students aged over 16 and proportion of these students holding vehicle licences.....	114
Table 10: Pearson Product - Correlations between variables of the TPB and PWM	117
Table 11: Hierarchical regression analysis predicting intention to cycle to school by variables of the theory of planned behaviour and Prototype/willingness model, controlled in Step 1 for demographic factors.....	118
Table 12: Results for questions 2, 4, and 6 concerning injunctive norm- parents	121
Table 13: Results for questions 3, 5 and 7 concerning injunctive norm – friends.....	123
Table 14: Results for question 12 and 13 concerning descriptive norms for both friends and parents	127
Table 15: Words used to describe girls on bikes	143
Table 16: Words used to describe girl in car	143
Table 17: Words used to describe boy on bike	144
Table 18: Words used to describe boy in car	145

Table 19: Ability to ride a bike	147
Table 20: Confidence riding a bike.....	148
Table 21: Student responses to question 12 regarding prototype evaluation.....	170
Table 22: Words used to describe girls on the bikes	171
Table 23: Words used to described the girl in the car.....	171
Table 24: Words used to describe the boy on the BMX bike	172
Table 25: Words used to describe the boy in the car	172

Abbreviations

AHS	Aranui High School
BI	Behavioural Intention
BMI	Body Mass Index
BW	Behavioural Willingness
CCC	Christchurch City Council
CHS	Cashmere High School
CBHS	Christchurch Boys' High School
CGHS	Christchurch Girls' High School
HHS	Hillmorton High School
LC	Linwood College
NZ	New Zealand
NZTA	New Zealand Transport Agency
OECD	Organisation for Economic Co-operation and Development
PWM	Prototype/willingness model
RHS	Riccarton High School
SRTS	Safe Routes to School
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
TTI	Theory of Triadic Influence
TTM	Transtheoretical Model
UK	United Kingdom
UNICEF	United Nations Children's Fund
US	United States of America
WHO	World Health Organisation

Chapter 1: Why research cycling to school by teenagers?

1.1 Introduction

When friends and family ask about my PhD topic, I tell them I'm researching why teenagers don't cycle to school. A common reply is "*so why don't they?*" Either that, or, as one friend said, "*Well you know the reason why don't you?*" I then wait for the answer, which comes in a short sentence "*it's the hair*" – if only it were so simple. It's definitely a conversation starter and like many aspects of transport, everyone has an opinion. If people are old enough, they often also say they always biked to school, but kids nowadays don't. This research examines why teenagers don't cycle to school in Christchurch, New Zealand, primarily using two theories used to model, explain and predict behaviour change – the Theory of Planned Behaviour (TPB) and the Prototype/willingness model (PWM).

1.2 Problem statement

Since 1960 developed countries, including New Zealand, have seen an increase in the kilometres travelled using private motor vehicles and a decrease in the use of other forms of transport such as walking, cycling and public transport, with cycling rates dropping significantly particularly for transport to school by high school students (Ministry of Transport, 2015). This is a problem as decreased cycle use is associated with increased use of motor vehicles with subsequent adverse effects in terms of climate change, health, congestion, social capital and children's desires and rights. Travel patterns in childhood also often influence patterns in adulthood, with consequent effects on health, well-being and the environment (M. Johansson, 2005). Society in New Zealand is based around the car. Any attempts to change this will require a major shift in the transport culture.

1.3 Approach and contribution

Cycling to school is an activity involving an interaction with place, space and the environment. Due primarily to distance, cycling to school is essentially an urban activity and therefore falls predominantly within the discipline of urban geography – “the geographical study of urban spaces and urban ways of being.” (Gregory, Johnston, Pratt, Watts, & Whatmore, 2011, p. 785). Additionally, as cycling to school is a utilitarian activity it comes under the transport geography umbrella, focussing on the movement of people and goods. Within this can be found four types of literature that pertain to this thesis and concern transport, travel and mobility – although the division is somewhat arbitrary and overlap exists (Pooley & Jones, 2013). The literature includes:

- 1) Mobilities literature, as promulgated by Urry (2000) including the study of the movement of people, ideas or goods.
- 2) Travel behaviour literature. This considers why people make the decisions they do regarding their choice of transport. Focus can be in relation to the type of people who choose different forms of transport and general conclusions can be made about travel behaviour or (as done in this thesis) about behavioural theories from psychology based largely on people’s attitudes, norms and intentions.
- 3) Environment and sustainability literature including consideration of the contribution of motor vehicles to greenhouse gas emissions and climate change, and the impacts of transport choices on health and effects such as pollution and congestion.
- 4) Engineering literature concerning practical problems and solutions (Pooley & Jones, 2013).

Mobilities literature will be considered in this thesis in terms of the existence of cycling to school for transport in Christchurch, and how embedded, normal and expected this is in the lives of people and in society. This thesis also draws heavily on travel behaviour literature, particularly in relation to behavioural theories from psychology. In addition, environment and sustainability literature is used as a framework to consider the factors that affect whether students cycle to school. Children’s geographies are also considered in recognition of

children's¹ distinct characteristics such as their limited mobility and control of their travel behaviour, vulnerability to hazards, and their specific needs.

Existing research on children's travel predominantly focusses on primary school-aged children. There are multiple reasons for this, such as; some researchers are more concerned and interested in the travel of this age group; it is easier for researchers to access primary schools than high schools where time pressures are greater; and/or because primary school-aged children are often perceived as being easier to work with than children of high school age. It is likely that different factors influence cycling by high school students compared to primary school students, primarily due to differences in their age and maturity but also due to the distance they travel to school. Additionally, a lack of literature regarding teenage cycling influenced this thesis topic and this gap in the literature merits further research.

Consideration of the travel behaviour of children is useful for a variety of reasons. First, researchers have found that the presence of children in a family increases the likelihood of car use due to the increased time constraints of parents (Giles-Corti & Donovan, 2003). Furthermore, households with children have been found to be less sensitive to increased parking or driving costs and less positive about the incidental benefits of walking such as exercise, social interaction, mental health etc. (Krizek, Forsyth, & Baum, 2009). This is due to the additional challenges faced by households with children including the slower speed children walk, the inexperience and lack of maturity of children in regards to road safety and perceived stranger danger by parents.

Consideration of the travel behaviour of teenagers is particularly relevant for a number of reasons. Teenagers (together with the old) have fewer restrictions on their time and therefore the greatest increases in the use of active transport may be obtained through travel behaviour change programmes focused on these groups (Bean, 2006). Furthermore, teenagers and the old are also most dependent on modes of transport other than the car (Billante, 2010).

¹ Although older teenagers, are not usually referred to in New Zealand as 'children', the terms 'children', 'teenagers' and 'adolescents' are all used in this thesis to describe people of high school-age. In New Zealand this ranges from 12 to 18 years of age.

Behaviour change theories can be used to explain and predict behaviour change. Two specific theories: the Theory of Planned Behaviour (TPB) and the Prototype/willingness model (PWM) have been used in this research, respectively, to explain travel behaviour and the behaviour of adolescents.

Looking at the mobilities, travel behaviour, and environment and sustainability, literature in relation to decisions by teenagers on cycling to school, the overall aim of this thesis was to work out why more teenagers do not cycle to school in Christchurch, New Zealand. To achieve this aim, the objectives were to determine:

1. The nature of cycling to school by teenagers in Christchurch.
2. The predictive validity of the TPB and the PWM with respect to students' decisions to cycle to school.
3. Which variables of the TPB and PWM have the greatest influence over teenagers' decisions regarding cycling to school?
4. The influence of intrapersonal factors and behaviour settings (as contained in the ecological model of active transport) on cycling to school for teenagers.
5. Whether teenagers who have grown up in places where few teenagers cycle to school (such as the UK) are influenced by different factors when they move to places like the Netherlands where almost everyone cycles to school.

1.4 Definitions

There are a few specific terms that are used throughout this thesis that require explanation:

- 1) In New Zealand, high school begins at year 9 and finishes at the end of year 13. Students in year 9 will typically be aged 12-14 years, year 11 will be 14-16 years and year 13 will be 16-18 years. Therefore, 'year 9', 'year 11' and 'year 13' will be used to describe students of 12-14 years, 14-16 years and 16-18 years respectively.
- 2) 'Student' is used to describe people of high school-age.
- 3) 'Active travel' or 'active transport' is used to describe travel by human-powered modes such as walking and cycling.
- 4) New Zealand legislation defines the term 'vehicle' to include bicycles. The use of motorised bicycles is not considered as part of this research.

- 5) 'Bike' refers to a bicycle (not a motorbike).
- 6) When comparing countries, this thesis only considers cycling in developed countries and does not consider the situation in developing countries which is often very different.

1.5 Thesis Structure

This chapter sets out the reasons for researching cycling to school by teenagers and how this will be done. Chapter 2 then examines cycling to school in the global context and considers the effects of current transportation trends in terms of peak oil, climate change, health, congestion, social capital and children's desires and rights. Using an ecological framework, the principle drivers of the choice by students to cycle to school are subsequently considered in relation to relevant literature (Chapter 3), including intrapersonal factors and behaviour setting. In order to provide a framework to undertake subsequent analysis, behaviour change theories and models to explain cycling behaviour are then considered in Chapter 4, with particular consideration given to the Theory of Planned Behaviour (TPB) and the Prototype/willingness model (PWM). Next, the methods used to collect data to examine the drivers of choice for teenagers to cycle to school are explained in Chapter 5. The results of surveys and focus groups with students, and interviews with staff, in Christchurch, New Zealand, and Voorschoten in The Hague Region of the Netherlands, are subsequently presented. These results are then discussed in Chapter 8 in terms of the key findings and recommendations are made with respect to increasing the percentage of teenagers cycling to school in Christchurch. Further research that could be undertaken and limitations of the research are also discussed.

Chapter 2: Global Transport Issues

2.1 Introduction

This chapter will consider transportation trends for both adults and children, both in a global and a New Zealand context. The effects of current transport trends are then considered in terms of climate change, health, congestion, social capital and children's desires and rights.

2.2 Transportation Trends

2.2.1 Transportation trends of adults

Since 1960 there has been an increase worldwide in urban mobility in the developed world due to increased affluence, greater access to private motor vehicles and population growth (Millard-Ball & Schipper, 2011). In addition, urban sprawl has influenced urban mobility, particularly in US, Canadian and Australian cities (Cameron, Lyons, & Kenworthy, 2004). As a consequence, in these countries the annual passenger kilometres per capita increased rapidly until the 1990s and has since levelled off (see Figure 1). There has also been a decline in annual kilometres per capita in some countries since around 2000 which may represent 'peak car'. 'Peak car' as a term was first used in 2010 and recognises that, contrary to previous assumptions, kilometres travelled has decreased in some locations including Australia, North America, Japan and much of Europe (Goodwin & Van Dender, 2013). This change has been recognised principally in relation to younger people (particularly men) in large cities with possible causes being rising fuel costs, economic downturn, greater environmental awareness and the substitution of communications technology for car use (Stokes, 2013). Davis, Dutzik and Baxandall (2012) conclude factors may have an impact for years to come and kilometres travelled

will continue to decline. The total number of trips made by walking, cycling and public transit has remained low in countries with high vehicle use (Litman, 2015). However, Litman concludes in future the number of trips made using automobiles will decrease and the number made by walking, cycling and public transit will increase as shown in his projections in Figures 2 and 3. Projections in Figures 2 and 3 recognise that the proportion of trips by automobile increased steadily during last century and peaked around 2000. Projections are also based on an assumption that the use of alternative modes will increase in future years.

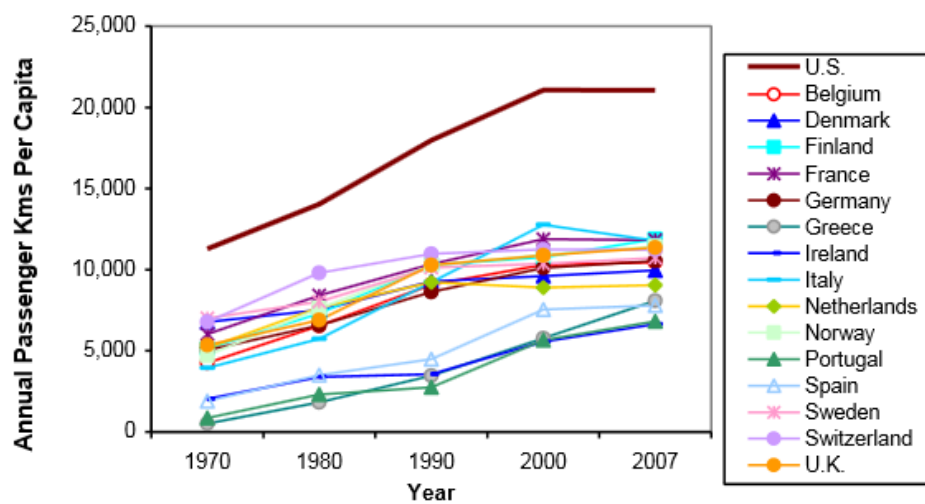


Figure 1: International Vehicle Travel Trends (Litman, 2015)

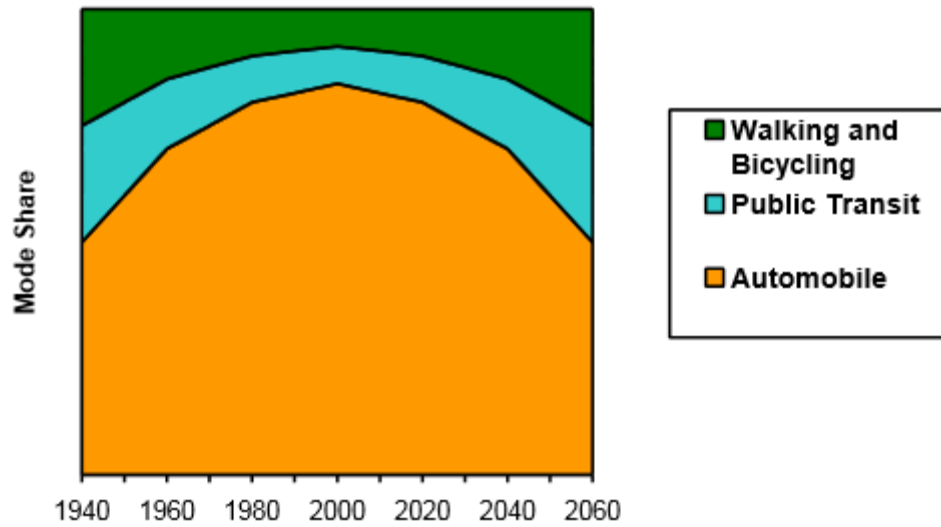


Figure 2: Typical Mode Share Trends (Litman, 2015)

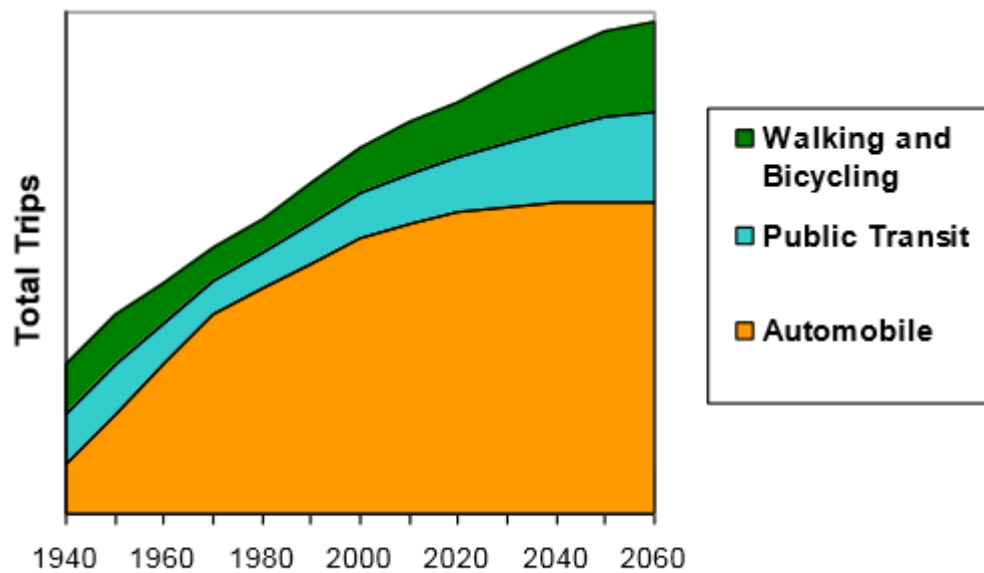


Figure 3: Typical Travel Growth Trends (Litman, 2008).

A comparison of the percentages of all trips undertaken using automobiles, walking, bicycling and public transit in 16 different countries shows much fewer percent of trips

by walking, bicycling and public transit in the USA and Australia than in countries such as the Netherlands and Switzerland. See Figure 4.

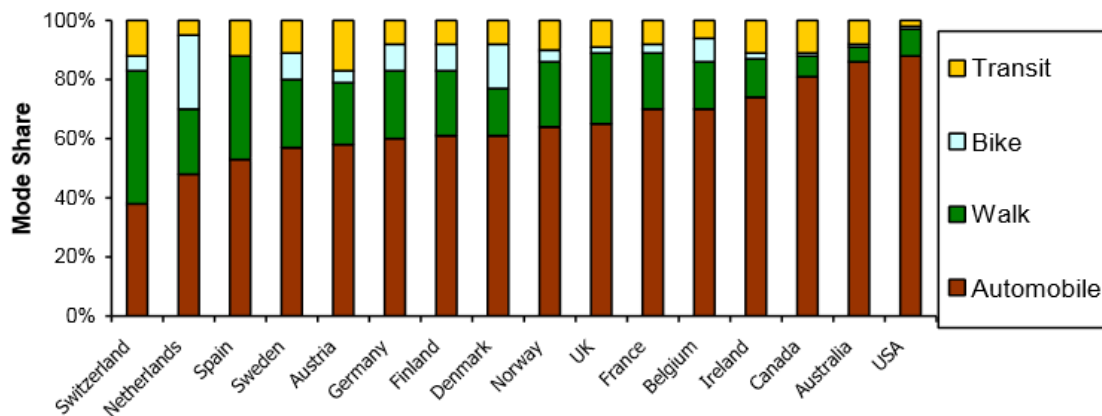
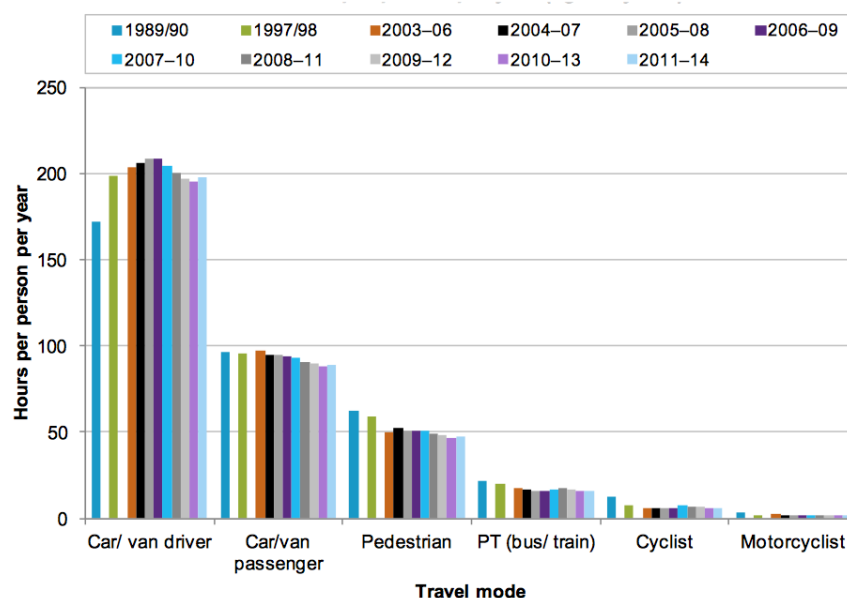


Figure 4: Percentage of trips taken by automobile, walking, bicycling, and public transit in countries of Europe, North America, and Australia. Note: Walk and bike trips combined for Spain. Work trips only were recorded for Spain, Australia and Canada (Bassett et al., 2008).

Annual passenger kilometres per capita and the percentage of trips undertaken by walking, bicycling and public transit in New Zealand are similar to those for Australia and the United States. These patterns are reflected in NZ data showing trends in hours travelled per person per year, by mode (Ministry of Transport, 2015) and the mode used by people to travel to work on census day (Statistics New Zealand, 2014a). As shown in Figure 5, since 1989/90 hours per person per year as a vehicle driver has increased, with peak levels reached in 2005/2009, followed by a subsequent decrease. In contrast, for pedestrians, PT (bus/train) and cyclists, hours per person per year have fallen since 1989/90, (Ministry of Transport, 2015).



Note: this graph visually compresses the time interval between 1989/90, 1997/98 and 2003-06

Figure 5: Trends in hours travelled per person per year, by mode (ages 5 and over) (Ministry of Transport, 2015).

Census figures show an increase in the percentage of people travelling to work on census day by car from 64.8% in 1976 (Tin Tin, Woodward, Thornley, & Ameratunga, 2009) to 82% in 2013 (Statistics New Zealand, 2014a). Consequently, in 2013, four out of five New Zealanders aged 15 years and over indicated they used a car as their main mode of transport to get to work. This increase in the use of private motor vehicles has been accompanied by a decrease in the number of people cycling, walking or using public transport over the same time period. In 2013, census figures showed one in 15 New Zealanders aged 15 years and over walked, and 1 in 36 cycled as their main mode of transport to get to work. A significant change between 1991 and 2013 was the decrease in the number of people cycling to work; the largest decrease being in the younger age groups, in particular the 15-19 year-old age-group – from 18% in 1991 to 4.2% in 2013² (see Figure 6). Since 2001 cycling rates have continued to drop for some age groups

² These percentages are calculated based on total number of people who answered this question (total stated) minus the number of people who gave no answer or who indicated they worked at home that day.

(including the 15-19 year-old age group) but have risen for other age groups, particularly those over 40 years of age (see Figure 6).

Overall, more males than females cycled in all age groups, with figures for 1991 showing 18% of males and only 11% of females aged 15-19 cycling to work. In 2013 these figures had decreased to 5.9% for males and 2% for females (see Figure 7). These figures are consistent with transport surveys completed at the University of Canterbury, where the number of students cycling dropped significantly between 1993 and 2000. This was accompanied by a corresponding increase in the use of cars, bus and walking during the same period (Nicholson & Kingham, 2003). Nicholson and Kingham considered car availability to have a substantial effect on mode choice with car availability increasing from 65% in 1993 to 90% in 2000.

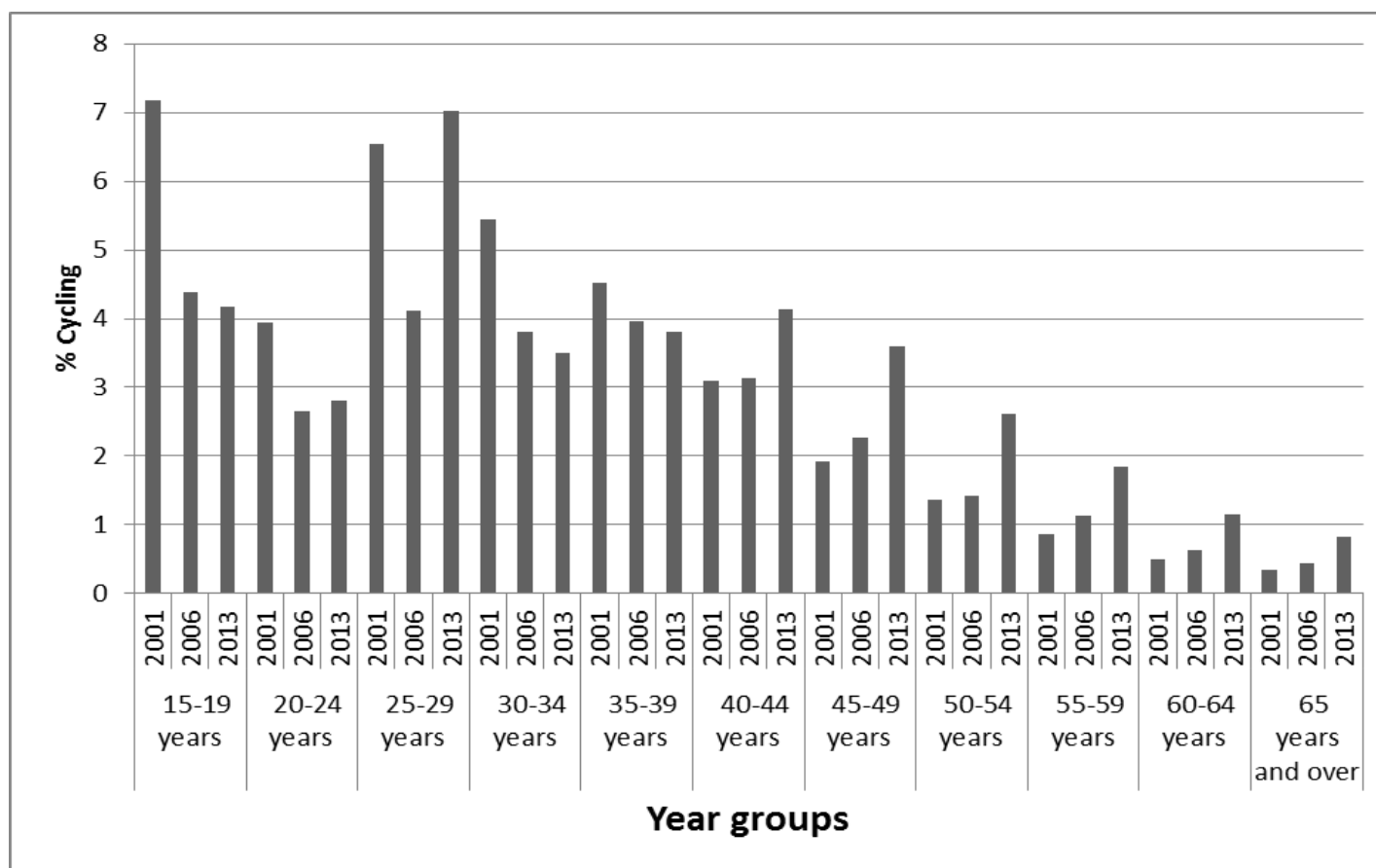


Figure 6: Proportion of people cycling to work on census day in 2001, 2006 and 2013 in New Zealand by year group (Statistics New Zealand, 2014a)

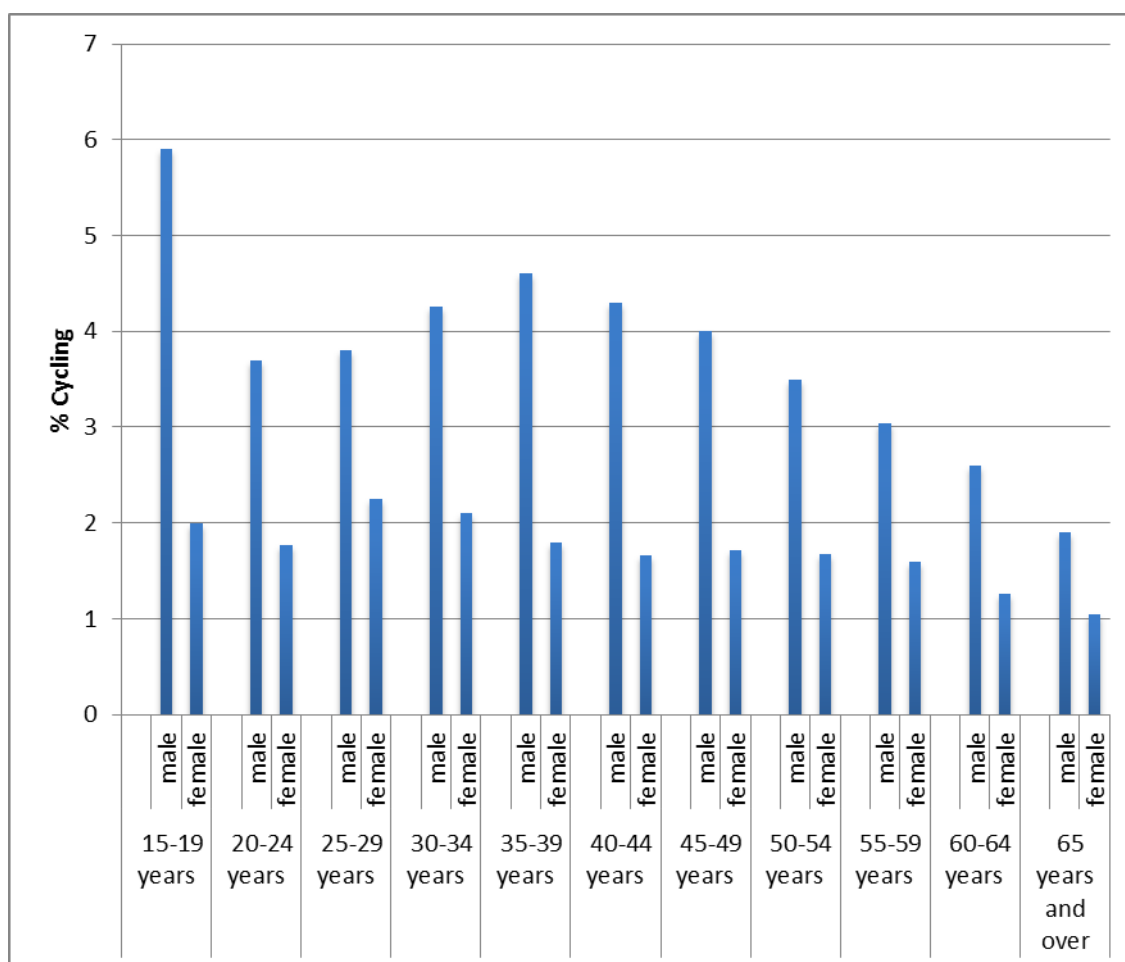


Figure 7: Proportion of people cycling to work on census day in 2013 in New Zealand by age and gender (Statistics New Zealand, 2014a)

The dominance of cars as a transport mode in New Zealand is reflected in the relative lack of measures to encourage cycle use. This contrasts with measures in countries such as The Netherlands and Germany where cycle rates are high and provisions include improved infrastructure for cycling, urban design to meet the needs of cyclists, traffic calming of residential neighbourhoods, restrictions on motor vehicle use in cities, traffic education of both motorists and non-motorists, and enforcement of traffic regulations protecting cyclists (Pucher & Dijkstra, 2003). These deficiencies are slowly being

addressed in several cities in New Zealand, including Christchurch, but the contrasting rates of cycling between New Zealand and countries such as The Netherlands and Germany indicate a lot more could be done.

2.2.2 Transportation trends of children

The transportation trends for travel to school by children and teenagers mirror that for travel to work by the general population and travel behaviour more broadly. Since the 1960s, greater proportions of children have been travelling to school by car and rates of Active Travel to School (ATS) have decreased throughout much of the developed world over the last five decades. In the United States rates of ATS decreased from 40.7% in 1969 to 12.9% in 2001 for children aged 5-18 years-old (McDonald, 2007). This decrease is slightly more extreme than for some other developed countries but similar patterns exist in Australia (van der Ploeg, Merom, Corpuz, & Bauman, 2008), Canada (Buliung, Mitra, & Faulkner, 2009) and the UK (Black, Collins, & Snell, 2001).

In New Zealand, the number of journeys per person per year for children aged 13-17 years who were driven to school increased from 30 in 1989/90 to 48 in 2005, with the sharpest increase occurring between 1989/90 and 1997/98 (Ministry of Transport, 2015). Correspondingly, for this age group the number of journeys per person per year for cycling decreased from 28 in 1989/90 to 5 in 2010-2014 (see Figure 8).

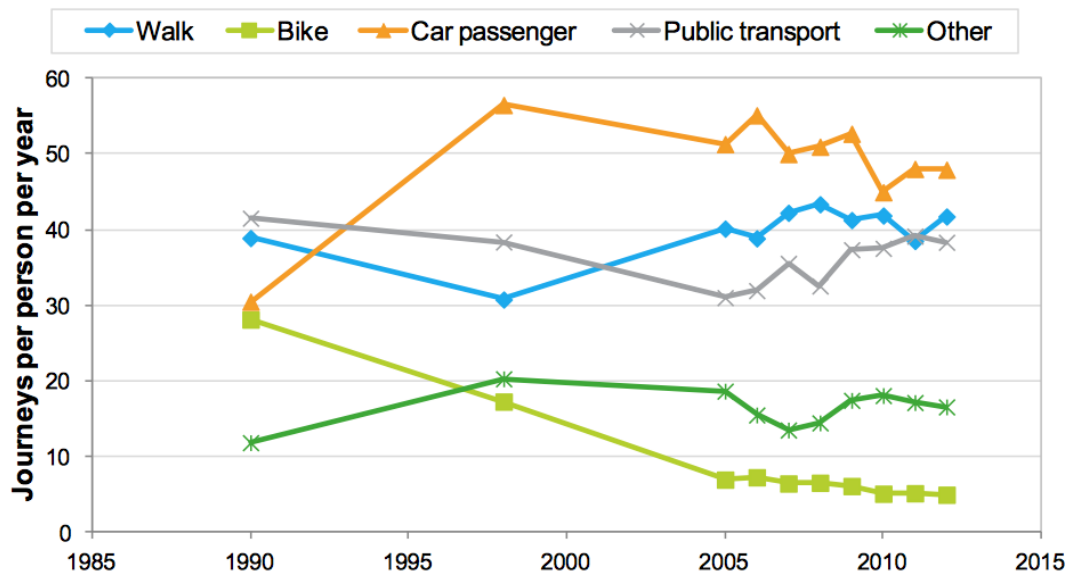


Figure 8: Travel to school – journeys per person – ages 13–17 (Ministry of Transport, 2015)

2.3 Climate change

An increase in the use of fossil fuels also affects climate change. Climate change is defined as any change in global temperatures and precipitation over time due to natural variability or to human activity. Greenhouse gases (CO_2 , CH_4 , N_2O), and members of the halocarbon and related families (CFCs, HCFCs and HFCs), trap infrared radiation from the Earth's surface and cause the greenhouse effect. This effect helps maintain a stable temperature and climate on Earth. However, since the mid-18th century the concentration of CO_2 in the atmosphere has increased by around 25% due to emissions primarily from the burning of fossil fuels, but also from land-use changes, especially deforestation (Callander, Maskell, & Mintzer, 1993). As a consequence, more infrared radiation is captured in the atmosphere. If current trends in human emissions of greenhouse gases continue, the combined effect of greenhouse gases will, by around the year 2030, be equivalent to doubling the CO_2 concentration. The resulting change in the radiation

balance is expected to increase the average annual temperature of the planet, including sea surface temperatures. Warmer temperatures would in turn result in sea level rise due to the thermal expansion of sea water, the melting of mountain glaciers, and, possibly, the reduction of water stored in the soil and vegetation on land. The rates of global warming projected under the Intergovernmental Panel on Climate Change (IPCC) scenarios are typically in the range 0.1-0.3 degrees Celsius per decade. Although such rates are small, it is considered they exceed those experienced during the past 10 000 years. It has also been estimated that in 2010, 14% of global greenhouse gas emissions came from the transport sector i.e. road, rail, air and marine transport (United States Environmental Protection Agency, 2016). In New Zealand, the Ministry of Transport reports that transport emissions represent 20 percent of the total greenhouse gas emissions each year (Ministry of Transport, 2016). By reducing the use of fossil fuels for transport purposes and reducing the kilometres travelled by motor vehicles, the effects on climate change can be reduced.

2.4 Health

2.4.1 Physical activity

The number of overweight and obese people in the developed world is a significant burden on society due to the associated health costs. In 2014 the World Health Organisation (WHO) reported around 39% of adults aged 18 were overweight and 13% were obese³ (World Health Organisation, 2015a). It also reported that globally more women were obese than men (11% of men, and 15% of women). The prevalence of obesity and overweight was highest in the Americas. In the US in 2007-2008, the prevalence of obesity was 32.2% among adult men and 35.5% among adult women (Flegal, Carroll, Ogden, & Curtin, 2010). While the US continues to have the highest

³ Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health (World Health Organisation, 2015b).

obesity levels in the world, the number of overweight and obese people in the developed world is increasing and will continue to be a burden on society due to the significant associated health costs (Flegal et al., 2010).

Consistent with international trends, in New Zealand the rates of obesity and overweight have increased since the 1980s (McLean et al., 2009). The Ministry of Health reported that in 2012, New Zealand ranked third highest out of 15 OECD countries for measures in obesity (Ministry of Health, 2015). In 2011-2013, the New Zealand Health Survey found 30% of New Zealand adults were obese and an additional 35% were overweight in terms of World Health Organization guidelines (Ministry of Health, 2015)⁴. The survey also found males were more likely to be overweight than females but obesity levels for both sexes were similar. In addition, it found major differences in terms of ethnicity, with 66% of all Pacific adults and nearly 50% of all Maori adults being obese, and adults living in the most deprived areas being four times as likely to be obese than those in least deprived areas.

With respect to children, the survey found 33% of New Zealand children aged 2-14 years were obese or overweight in 2011-2013 in terms of World Health Organization guidelines. Similar to adults, the survey also found higher rates of obesity in Pacific and Maori children and the same comparison between the most and least deprived areas (Ministry of Health, 2015).

As mentioned above, the number of overweight and obese people creates a significant financial burden on society. On the basis of data collected between 1990 and 2001, it was calculated that obesity accounted for 5.5–7.0% of national health expenditure in the United States and 2.5% in New Zealand (Thompson & Wolf, 2001). Overall, obesity is a large cost to developed countries throughout the world, and also has high costs in terms of reduced life expectancy and life enjoyment.

An increase in the use of motor vehicles in the developed world has in recent decades occurred at the same time as an increase in the prevalence of obesity. Although no causal

⁴ These guidelines define overweight and obese as abnormal or excessive fat accumulation that may impair health. They measure weight in terms of the Body mass index (BMI) an index of weight-for-height.

link has been shown between adult levels of walking and cycling and obesity, countries with higher levels of walking and cycling generally have lower rates of obesity as shown in Figure 9 (Bassett, Pucher, Buehler, Thompson, & Crouter, 2008). In the US, Luke and Cooper (2013) concluded that variation in physical activity does not modulate the risk of obesity. Some researchers, however, have concluded that reducing inactive behaviours is a way to prevent childhood obesity in some children (Gortmaker et al., 1999; Gutin & Manos, 1993; Tudor-Locke, Ainsworth, & Popkin, 2001).

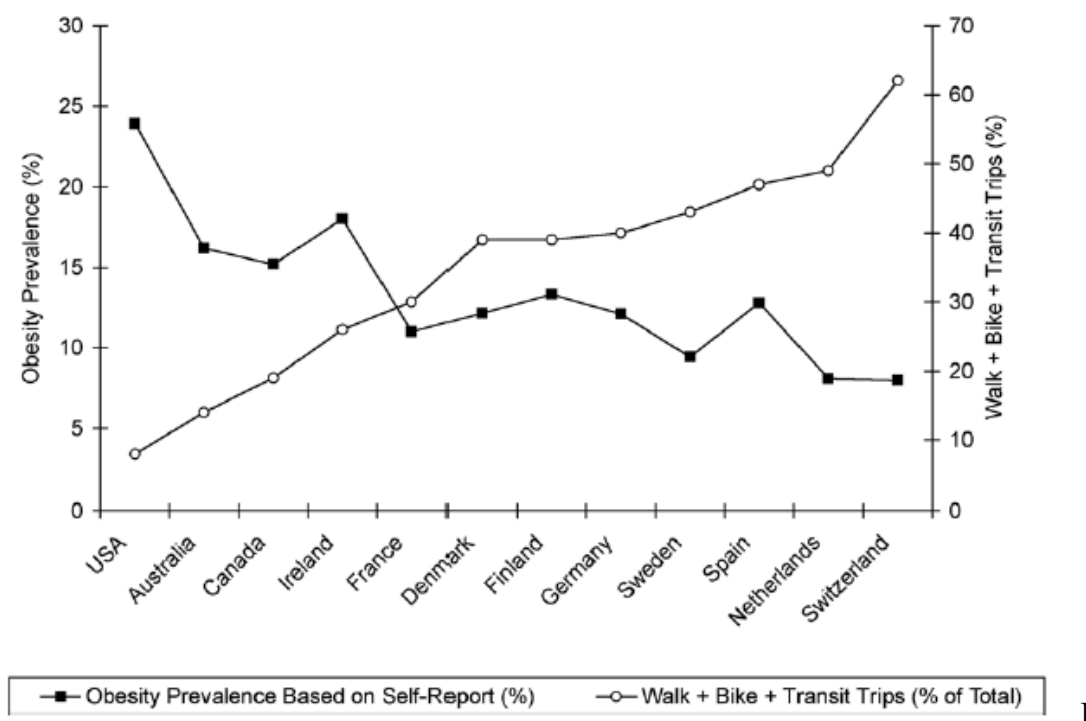


Figure 9: Obesity (BMI ≥ 30 kg m⁻²) prevalence and rates of active transportation (defined as the combined percentage of trips taken by walking, bicycling, and public transit) in countries of Europe, North America, and Australia⁵ (Bassett et al., 2008).

Increased physical activity by children has also been linked to decreased risk of developing cardiovascular risk factors as adults (Boreham & Riddoch, 2001). Increases in

⁵ BMI was computed from self-reported height and weight. Data were obtained from national surveys of travel behaviour and health indicators conducted between 1994 and 2006.

walking and cycling to school are considered to be an important source of physical activity in children and therefore may result in improved child and subsequently adult health (Timperio, Crawford, Telford, & Salmon, 2004). Glanz and Sallis (2006), Cooper, Page, Foster, and Qahwaji (2003) also concluded that for boys in the UK walking to school was linked to being more physically active but this was not the case for girls. Others have concluded the link between childrens' physical activity and active travel requires further investigation (Tudor-Locke et al., 2001). Overall, a lack of consensus exists regarding this link.

2.4.2 Air pollution

Increased use of motor vehicles also affects air quality. Studies over many years have shown a clear link between exposure of people to pollutants in the air and their health (Brunekreef & Holgate, 2002). The burning of fossil fuels to power vehicles results in the release of carbon dioxide (a greenhouse gas) in addition to nitrogen oxides, volatile organic compounds, carbon monoxide, benzene and particulate matter. These by-products can be particularly harmful to humans and other species. In New Zealand, these effects are particularly significant for children, Maori, people in low socio-economic groups, people who exercise outdoors and people within city centres (Stevenson, Banwell, & Pink, 2006). The effects of air pollution on the health of New Zealanders was investigated in the HAPiNZ or Health and Air Pollution in New Zealand study (Fisher, Kjellstrom, Kingham, Hales, & Shrestha, 2007). This study found that for those over 30 years old in 2001 as a result of air pollution from vehicles, there were 541 extra cases of bronchitis and related illnesses; 500 deaths due to PM₁₀, NO₂ and CO; 246 extra hospital admissions for respiratory and cardiac illnesses and 671,000 restricted activity days (days on which people cannot do the things they might otherwise have done if air pollution was not present).

2.4.3 Road traffic accidents

The cost of road accidents is also an important consideration with respect to increased car use. Statistics from the New Zealand Transport Agency (NZTA) show 306 fatalities occurred on our roads in the 12 months prior to 5 May 2015, with 217 of these fatalities being car drivers or passengers (New Zealand Transport Agency, 2015b). In addition, many more people are injured by road accidents every year. Not only are road accidents detrimental to people's health but they are also very costly in terms of the direct and indirect costs. These costs include medical treatment, ambulance costs, aftercare, rehabilitation, nursing, financial aid, police and legal costs, insurance costs, new employment costs and property damage (Becker et al., 2002, as cited in Jakob, Craig, and Fisher (2006)). When thought of in relation to the GNP of a country, Elvik (2000) found the average total costs of road accidents (including an economic valuation of lost quality of life) for twelve countries, to be about 2.5% of the gross national product. In New Zealand the total costs of road accidents for 1991 was \$3691million, with a GNP of \$83072million – i.e. 4.4%. Therefore, in 1991, the total costs of road accidents as a percentage of GNP in New Zealand was 1.9% higher than the average for the twelve countries considered by Elvik.

With respect to the relationship between transport, the environment and health, children have been identified as a particularly vulnerable group (World Health Organisation, 2000). This is reflected in the fact that in many countries in Europe, traffic-related injuries are the most common single cause of hospital admissions for children aged 5-15 years and 33% of all road traffic deaths concern people less than 25 years of age (World Health Organisation, 2000). As a result, many children's transport choices are limited to less active modes with consequent adverse effects on cardiovascular risk factors (such as obesity). This is a particular concern as activity patterns of childhood frequently continue in adulthood (M. Johansson, 2005). Consequently, the travel of children is likely to have effects that are long lasting.

2.5 Congestion

Congestion is a further factor to consider in regard to the travel behaviour of students, as not only does it have implications for air pollution, death and accident rates (and frustration for motorists) but it also uses additional fuel; and has an economic cost as a result of increased travel times. Many of the roads in cities in New Zealand are congested with vehicles, particularly during the morning and evening peak hours when many people travel to and from work (Sankaran, Gore, & Coldwell, 2005). The causes of traffic congestion include increased population and greater numbers of motor vehicles using our roads. As greater numbers of children are transported to school by motor vehicles, the contribution of school traffic to traffic congestion has gained attention with research in the US estimating 10-14% of all private vehicles on the road during morning peaks to be associated with school trips (McDonald, Brown, Marchetti, & Pedroso, 2011). In Auckland, educational travel has been estimated to account for 40% of peak-time traffic (Sankaran et al., 2005) but throughout NZ school travel makes up only 4% of trip legs (Ministry of Transport, 2015). School travel is however, recognised as important not only due to the health implications, but also as the timing of school travel coincides with morning peak in traffic (Ministry of Transport, 2015). Consideration of why so few students cycle to school is relevant when considering congestion.

2.6 Children's rights and social capital

In addition to the costs associated with climate change, health, and congestion, two further factors to consider in relation to the effects of current transport trends in New Zealand are children's rights and the effects of travel choices on social capital. Consideration of the rights and desires of children is relevant as decisions regarding travel choice are made predominantly by adults, but these decisions affect children. The Convention on the Rights of the Child was established in 1989 and sets out the rights of people under the age of 18. The four core principles of the Convention are “non-

discrimination; devotion to the best interests of the child; the right to life, survival and development; and respect for the views of the child” (Unicef, 2011).

Although primarily concerned with survival and protection, Article 12 is particularly relevant as it states that children should be given the right to express their views and their views must be given weight (United Nations, 1989). This is relevant in respect of children’s travel behaviour, as often the views of the child and their rights to development are subverted by parental and societal concerns for their survival. An example of this is that, when asked, children have been found to favour walking or cycling to school but their parents will often not allow them to walk or cycle (Mitchell, Kearns, & Collins, 2007; Rice, 2008). This may be because travel does not just provide children with a way to get from A to B, but can also be valued by children for social, environmental and health reasons (Mitchell et al., 2007). Discrepancies have also been found between children’s and parents’ perceptions of safety, where children perceive a neighbourhood to be safe, while their parents do not (Freeman & Tranter, 2010). Consequently, children’s rights with respect to their choice of travel are subverted by the concerns of their parents and society for their safety. This discrepancy limits to a degree their ability to participate fully in cultural and social life, limits their physical independence and does not respect their views. A further associated effect of a decrease in active travel by children is that a child spends less time in the local environment and therefore has less opportunity to learn about their environment and how to find their way around. This affects their spatial knowledge of their environment and is often referred to as a cognitive map (Paskins, 2005). Consequently, the Convention on the Rights of the Child is not being met in its entirety in car-centric cities with respect to the travel of children.

The increased use of motor vehicles also affects levels of social capital. Social capital can be defined as the levels of social and community engagement in a community. Increasing numbers of researchers consider people in communities with higher levels of social capital enjoy better health. In an example of this, Leyden (2003) found people living in environments where they walked more, were more likely to trust others, be involved politically, be socially engaged and more likely to know their neighbours. In addition, Brown et al., (2008) found architectural features such as the design of front yards

facilitated visual and social contacts and this could enhance the physical health of people living in communities. The presence of children on the street has also been considered to be particularly beneficial in terms of social capital as, due to their lack of reserve when compared to adults, they encourage sociability in the community (Weller & Bruegel, 2009).

2.7 Conclusions

Overall, the global trend is that ‘peak car’ may have been reached in some developed countries. However, in developed countries, such as NZ, where existing cycling rates are low, as Litman concludes (2015), this is yet to have a major effect on the number of trips made by walking, cycling and public transport in these countries. As a consequence the effects of the high use of motor vehicles will continue to be an issue in relation to climate change, health, congestion, social capital and children’s desires and rights. The use of bicycles to cycle to school is an important part of this issue. Theories concerning behaviour change and the ecological model will subsequently be considered as a framework to examine these conclusions further.

Chapter 3: Determinants of intention to cycle to school

3.1 Introduction

Many behaviour change theories have been used to explain and predict behaviour change. These include the Theory of Planned Behaviour (TPB), the Prototype/willingness model (PWM), Social Identity Theory, the Theory of Interpersonal Behaviour (TIB) and the Transtheoretical Model (TTM). These, and other behaviour change theories, will be discussed in chapter 4. In recognition, however, of the many factors that affect the decisions of students to cycle to school, this chapter will first consider these factors from a broader perspective. Examples of theories, frameworks and ecological models that recognise the influence of multiple levels of factors that influence behaviours include the Theory of Triadic Influence (Flay, Snyder, & Petraitis, 2009), Dahlgren's Determinants of Health (Dahlgren & Whitehead, 1992), and the Ecological Model of Four Domains of Active Living (Sallis et al., 2006). These three theories/frameworks/models recognise slightly different factors as follows:

- a) The Theory of Triadic Influence (TTI) recognises 'distal determinants' (the cultural environment, social environment and biological/personality factors), 'proximal determinants' (attitude, subjective norm and perceived behavioural control⁶) and intention.
- b) Dahlgren's Determinants of Health (DOH) recognises the influence of age, sex and constitutional factors, individual lifestyle factors, social and community networks, living and working conditions and general socio-economic, cultural and environmental conditions. (Note that the DOH is most accurately described as a conceptual framework rather than a theory or model as it does not specify

⁶ Subjective norm refers to what people ought to do. Perceived behavioural control refers to the perceived ease or difficulty of engaging in a behaviour. Attitudes, subjective norm and perceived behavioural control are discussed further in chapter 4.

particular relationships and mechanisms, and is more schematic, big picture, and indicative.)

- c) The Ecological Model of Four Domains of Active Living, Sallis et al. (2006) concerns active recreation, active transport, household activities and occupational activities. It recognises seven groups of factors that influence active living: Intrapersonal (demographics, biological, psychological and family situations), perceived environment, behaviour settings (access and characteristics), policy environment, information environment, social cultural environment and natural environment.

Several researchers have concluded that behavioural models and theories are best at predicting behaviour when they are used for purposes similar to those to which they were developed (Darnton, 2008; Giles-Corti, Timperio, Bull, & Pikora, 2005; Sallis, Owen, & Fisher, 2008). These conclusions are made because the development of behavioural models and theories requires a thorough understanding of the target behaviour and the variation in that behaviour within a sample group. For example, the likelihood people will give blood will be influenced by very different factors to the type of cars people buy. When giving blood, factors such as habit and past behaviour are likely to be important, whereas when buying a car, factors such as emotions and self-identity are likely to be important.

One of the four domains of active living as recognised by Sallis et al. (2006) is active transport. Therefore, based on conclusions of Giles-Corti et al. (2005), Darnton (2008) and Sallis et al. (2008), this model will be used as a framework for this research on cycling to school, in preference to The Theory of Triadic Influence (TTI) or Dahlgren's Determinants of Health (DOH).

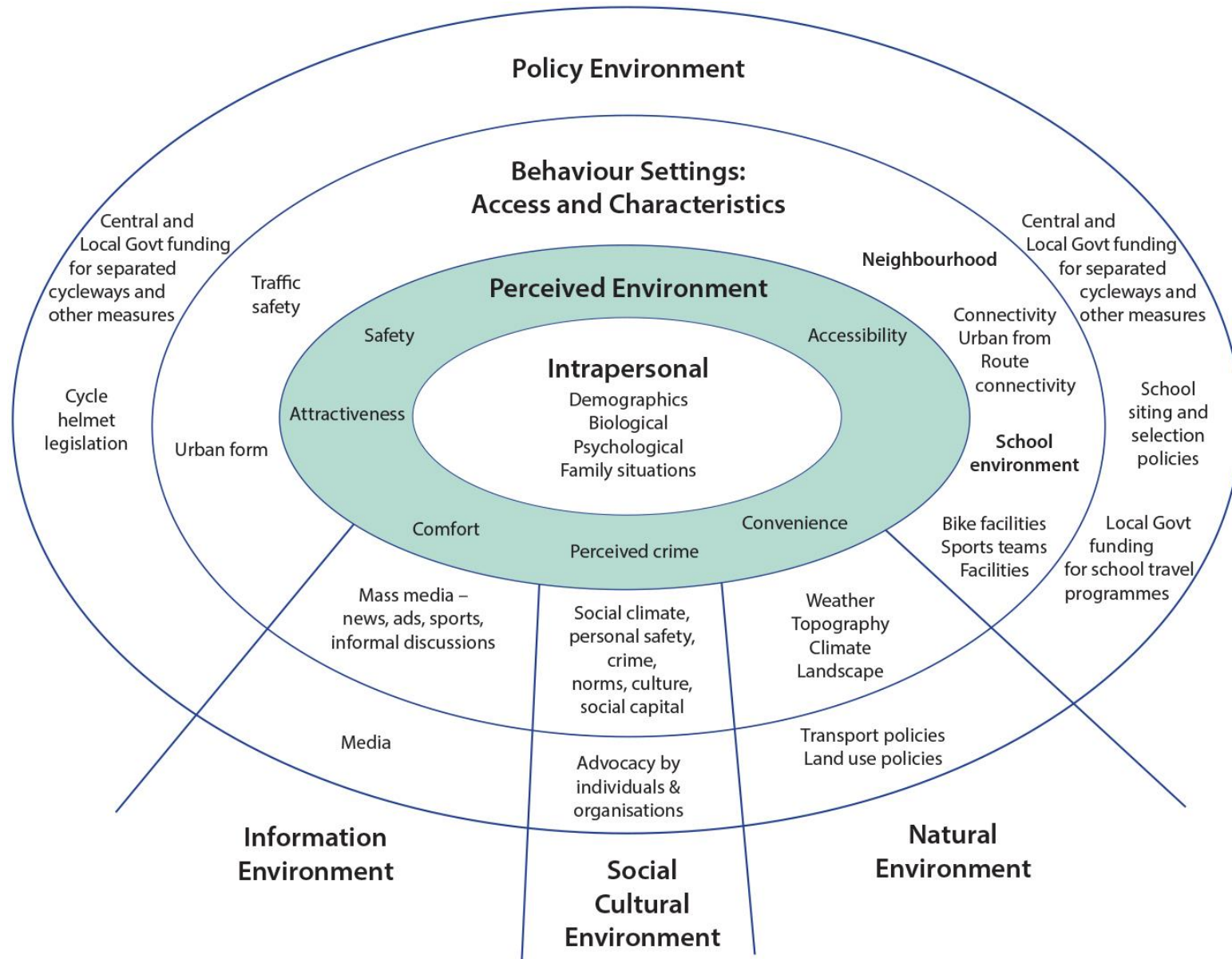
The Ecological Model of Four Domains of Active Living provides a useful framework to develop an ecological model in relation to cycling for transport to school. I have adapted the Ecological Model of Four Domains of Active Living to create an Ecological Model of Cycling for Transport to School (see Figure 10). I have then considered the many factors that influence the decision by students to cycle to school using this model as a framework

as it takes into account individual, external and societal factors and recognises inter-relationships between the various factors.

Walking and cycling are often considered in tandem by researchers due to the nature of both modes being 'active' and also due to the low cycling rates in some countries (e.g. the US). In some research, cycling to school is excluded from analysis altogether (McDonald, 2008). In some ways the consideration of cycling and walking in tandem has benefits as it means that at least cycling is considered as a means of transport, despite few people cycling. It is also however, an issue to be aware of, as different factors influence walking and cycling and consequently, it is more useful if the two activities are considered separately (Pikora, Giles-Corti, Bull, Jamrozik, & Donovan, 2003). This limitation needs to be born in mind, when considering existing literature, and also interpreting it.

The following section examines factors related to the intrapersonal, perceived environment and behaviour setting, as contained in the Ecological Model of Cycling for Transport to School.

Figure 10: Ecological Model of Cycling for Transport to School (Adapted from the Ecological Model of Four Domains of Active Living (Sallis et al., 2006))



3.2 Intrapersonal factors

Intrapersonal factors that influence cycling rates for adolescents include demographics such as age, gender, ethnicity, socio-economic status, peers and parents. This section examines each of these factors.

3.2.1 Age and cycling rates

Many studies have found cycling rates differ for different age groups (Grize, Bringolf-Isler, Martin, & Braun-Fahrlander, 2010; Horspool, 2006; Sirard & Slater, 2008). In countries with low levels of cycling, the percentage of people cycling in younger age groups is generally higher than for older age groups. New Zealand is typical of such countries. The NZ Household Travel Survey found 67% of people aged 5-12 years cycled at some time in the last year, compared to 53% for those aged 13-17 years and only 30% for those 18 years or over (Ministry of Transport, 2013b). The 2013 NZ Census showed the proportion of people cycling to work was highest for those in the younger age groups and decreased for older age groups (Statistics New Zealand, 2014a). Similar statistics exist in Australia (Bell, Garrard, & Swinburn, 2005). In countries where cycling rates are high such as the Netherlands and Denmark, cycling rates are still greatest for those generally under 19 years-old, but fall much less with age (Pucher & Buehler, 2008). Furthermore, in some countries with high cycling rates, the percentage of older people cycling exceeds that for younger people; for example in Germany for the years 2000-2002, the bike share of trips for 18-24 year-olds was 7% whereas the share for those over 65 years of age was 12% (Pucher & Buehler, 2008).

Many researchers have also gathered data on the rates of cycling among school-age children and how rates vary with age. In a review of walking and cycling to school, Sirard and Slater (2008) found in nine of 15 studies in the UK, USA, Australia and Denmark there was no link between age group (or year group) and active commuting to school. However, as walking and cycling are different activities, it cannot be definitively concluded that a link does not exist between age group and cycling to school. Existing literature regarding cycling rates for children and age is scarce, however, research by Horspool (2006) suggests the same trend as for adults, with older children cycling less in countries with low cycling rates. For example, in New Zealand, Horspool (2006) concluded 13 and 14 year-olds were more likely to be

concerned about their image while cycling and think cycling was uncool (and therefore cycle less) compared to 12 year-olds. In contrast, in countries where cycle rates are high, older children do not cycle less. For example, in Switzerland where 70% of children cycle or walk to school, Grize et al. (2010) found cycling to school increased with age for 6-14 year-olds. Therefore, in countries with low cycling rates, a greater proportion of younger, compared to older students, are likely to cycle to high school.

In countries where cycling rates are low, cycling is often considered by many adults to be a ‘childish’ activity (O'Rourke, 1987). This mirrors attitudes of teenagers to sport and physical education where some activities are considered “childish” (Allender, Cowburn, & Foster, 2006, p. 831). In addition, physical activity is often greatest for younger age groups and decreases as people age. This is partly because older people are less mobile due to the physical consequences of age, but also because societal norms influence their activity rates. In addition, other factors, such as the ability to use other modes of transport such as private motor vehicles, also influence the transport use of older people. Of particular relevance to this thesis are the reasons for these changes in relation to the adolescent years.

Adolescence is a time when identity, self-esteem and peer relationships are very important (Aldous, 1983). It is also a time when many people change their attitudes to cycling and physical activity. Research shows different stages within the adolescent years. Carver, Watson, Shaw, and Hillman (2013) found both age and school stage affected children's independent mobility, with the greatest change occurring at the transition from primary to secondary school. It is therefore logical that adolescents' attitudes to cycling and cycling rates will also differ throughout adolescence. As mentioned above in this section, there is a lack of research exploring the link between age and cycling rates. However, it is likely younger high school students will have more positive attitudes to cycling to school, than older students.

3.2.2 Gender and cycling rates

Cycling rates for men and woman around the world differ based to some degree on the overall cycling rates for different localities. In countries with low cycling rates, such as New Zealand, males cycle more than females. These rates are mirrored in student cycling rates for these countries. For example, in Australia (Leslie, Kremer, Toumbourou, & Williams, 2010;

Timperio et al., 2006), the UK (Panter, Jones, van Sluijs, & Griffin, 2009) and New Zealand (Ministry of Transport, 2013b), where more boys cycle than girls. Specific research on adolescents in Auckland, NZ, found boys were seven times more likely to cycle to school than girls (Horspool, 2006). Timperio et al. (2004) also recognised gender differences in active travel increase with age. In contrast, research on students 5-18 years of age in the US (Kerr et al., 2006) and Switzerland (Grize et al., 2010), concluded gender did not influence whether or not high school students cycle to school. These results may, however, have been influenced by the large age range of the children in these studies. In general, literature recognising gender differences in active travel dominates.

In countries such as Denmark and the Netherlands where cycling rates are high (Pucher & Buehler, 2008), the percentage of cycling trips undertaken by women is higher than for men – in Denmark 17% for women and 15% for men, and in The Netherlands, 31% for women and 26% for men (Garrard, 2003). However, although Bassett, Pucher, Buehler, Thompson, and Crouter (2008) reported in Sweden 23% of all trips were undertaken by bicycle, a study in Stockholm found fewer 13-14 year old girls actively commuting than boys of the same age (K. Johansson, Hasselberg, & Laflamme, 2010). This lack of similarity between adults and adolescents indicates other factors must play a part.

Factors influencing the cycling rates for different genders include differences in the independence parents afford to boys and girls. Differences in the independence parents afford to boys and girls prior to adolescence have been considered in terms of the ‘range’ of children (Hart, 1979; Matthews, 1992, p. 18), and ‘licence holding’ (Hillman, Adams, & Whitelegg, 1990) where ‘range’ refers to how far and where children are allowed to go on their own and ‘licence holding’ refers to permission given by parents to children to travel independently. In the 1970s, Hart (1979) concluded the *range* of girls was smaller than that of boys, as girls were required to perform a greater number of domestic duties than boys and parents had greater concerns with respect to the safety of girls than boys. Research in the 1980s and 90s in the UK also concluded boys were allowed to spend more time outdoors than girls (Matthews, 1992) and 11 year-old boys had more spatial freedom than girls (Matthews, 1987). Research in the US also concluded boys were more likely to be allowed to use active transport to travel to school than girls (McMillan, Day, Boarnet, Alfonzo, & Anderson, 2006). Furthermore, McMillan et al. (2006) and Prezza et al. (2001), concluded in Rome, Italy, boys aged 7-12 years, were more autonomous than girls. Therefore, although greater

gender equality exists today than 40 years ago, and it might be assumed differences between the independence given by parents to boys and girls has reduced, some differences in the freedom given to boys and girls still remain. Such differences in the *range* of children prior to adolescence may influence their subsequent confidence and ability to cycle to school when they become adolescents.

Differences between girls and boys in relation to pressures to conform, body image and looks may also result in differing cycling rates between the genders. Pressure to conform is a component of identity search and is relevant in relation to adolescence for both boys and girls. Some researchers have concluded however that adolescent girls experience greater pressure in terms of dress, conformity and social involvement than boys (Manning & Allen, 1987; Youniss & Haynie, 1992). These conclusions are reinforced by conclusions of Simmons and Blythe (1987), with respect to the dramatic physical changes during adolescence, as they concluded from age 12-13 years, girls began to care more about their looks and body build (figure and muscle) than boys, and by Grade 9 (14-15 years-old) this difference is statistically significant in relation to other factors. In addition, body image and clothing have been found to influence adult women cycling in London (Green, Steinbach, & Datta, 2012; Steinbach, Green, Datta, & Edwards, 2011). Therefore, pressures to conform, body image and looks, particularly for girls may contribute to the different cycling rates for adolescent boys and girls in many countries.

In addition to differences in independence and pressures regarding body image and looks, a myriad of other factors may affect cycling rates for adolescent boys and girls. These were highlighted by Garrard, Crawford, and Hakman (2006) who concluded that although adult females and males in Melbourne showed similar reasons for not cycling, some constraints were much more significant for females including concerns about cycling in traffic, aggression from motorists, inhaling fumes, lack of confidence in bike maintenance, lack of cycling ability and cycle skills. Lack of knowledge of local cycle routes and feeling self-conscious in cycle clothing (and attracting unwanted harassment from men when wearing cycling clothing) were also constraints for females (Garrard et al., 2006). Due to the similarities between the cycling rates in Melbourne and Christchurch, and between adolescents and adults, these issues are likely to also be significant for adolescents in Christchurch.

An issue usually not relevant to adults, but often relevant to adolescents in Christchurch, is the wearing of school uniforms when cycling. School uniforms were recognised as a potential barrier to cycling to school by year 9 and 10 girls in Auckland, NZ (Horspool, 2006). Possibly as school uniforms are not common in Europe and North America, there is little literature on the influence of school uniform on bike riding. The wearing of short skirts as part of a physical education uniform, and the inability to wear cycling shorts has however been recognised as a problem by girls in the UK (A. Williams & Bedward, 2002). The influence of the wearing of school uniforms when cycling is a potential topic for further research.

3.2.3 Ethnicity

In addition to age and gender, cycling rates may also differ due to ethnicity. Research suggests, however, that it is not easy to isolate ethnicity from other influencing factors. Matthews (1992) cautions research on the effects of ethnicity on children's environmental experience as he concludes it is difficult to disentangle ethnic effects from other social considerations such as class. Betancourt and Lopez (1993) also recognise specific factors underlie culture, ethnicity and race and therefore conclude one should be wary of making conclusions based purely on these factors as there will be other factors involved. Furthermore, Sirard and Slater (2008) in their review of walking and cycling to school, reported in six quantitative US studies and one UK study of the relationship between ethnicity and active commuting, the results were mixed with some studies reporting a positive association, one a negative association and others no association. Carlin et al. (1997) also concluded that after adjusting for school type, the strongest predictors of walking to school in two Australian cities were low car ownership, non-English-speaking background and lower occupational category. Therefore, the conclusions of Sirard and Slater (2008) and Carlin et al. (1997) both suggest Matthews conclusions regarding the difficulty in disentangling ethnic effects from other social considerations may have some validity.

Some researchers have, however, made conclusions about the relationships between cycling and ethnicity. Qualitative research by Steinbach et al. (2011), on the relationship between gendered, ethnic and class identities and healthy transport choices and work by Green, Steinbach and Datta (2012) on mobility, provide some useful insights and conclusions

regarding the views of Asian and Black people in London towards cycling. Steinbach et al. (2011) concluded for many White professional men and women, cycling reflected their ethical and aesthetic attitudes and therefore signified a specifically bourgeois sensibility. However, they concluded for non-White professionals, cycling was often seen as a low status transport. Furthermore, for Black communities, the associations with cycling may be quite different than for White professional communities (e.g. it may be seen as a fun or deviant activity for Black youth). Black women cyclists also recognised they were few in number and a group of Asian women greeted the question “does anyone here cycle?” with laughter and then described why they thought cycling was “ridiculous” (Steinbach et al., 2011, p. 1126) or “an absurd suggestion” (Green et al., 2012, p. 19) due to the difficulties of carrying children, impracticalities of long clothing and the inappropriateness of cycling for women in their community. Steinbach et al.’s conclusion in relation to these views was that cycling as a transport mode had greater resonance for some social identities than for others. Looking at the issue of ethnicity and travel choices in London more broadly, Green et al. concluded that not cycling was an additional indicator of marginality for minority groups, as suggested by a woman in her interview:

I'm a Muslim, [national identity] female, I don't think it's, it would be culturally accepted if I were to [cycle]...people would raise their eyebrows, it would really make me self-conscious, people would think I was really tight because I'm probably obviously saving on the pennies, no-one sees it in terms of environmental friendliness or unfriendliness (Jasmine, non-cyclist, 25-34, 'Asian') (Green et al., 2012, p.20).

Such views are likely to be relevant for people of minority nationalities around the world, including New Zealand.

3.2.4 Socioeconomic Status

Socioeconomic Status (SES) has been defined as “a broad concept that refers to the placement of persons, families, households and census tracts or other aggregates with respect to the capacity to create or consume goods that are valued in our society” (Miech & Hauser, 2001, p. 75). SES in relation to children has been measured using various indicators such as parents’ educational attainment, parents’ occupational status, household income, school-level

SES measures (e.g. percentage of students on welfare), home ownership, and (less directly) family car ownership (Davison, Werder, & Lawson, 2008; Miech & Hauser, 2001). However, as for ethnicity, conclusions by Matthews (1992) and Carlin et al (1997), regarding the difficulty in disentangling different social considerations, are likely to apply. Research in the US, has identified SES can affect active commuting rates of children, with low rates associated with high SES (Davison et al., 2008; Evenson, Huston, McMillen, Bors, & Ward, 2003). These findings are, however, contrary to the findings of Rice (2008) regarding the travel choices of primary school pupils in Christchurch, who concluded active transport to and from school was greater at both ends of the socioeconomic spectrum: That is, children of low SES often travelled to school without their parents and therefore were more likely to actively commute to school whereas for children of high SES it was more likely one parent did not work, or that parents had more flexibility in their employment and therefore were more available to walk children to school (and therefore less likely to drive them). Research by Williams et al. (2009) regarding how home, community, school and adult work affect opportunity for teenagers in suburban Australia, are congruent with Rice's as they also concluded parents from higher socioeconomic backgrounds were more likely to have flexible working schedules and teenagers of these parents benefited from this as they had greater mobility. Additionally, they concluded the lack of a second car reduced the mobility of teenagers from lower socioeconomic backgrounds. Davison et al. (2008) and Rice (2008) both considered 'active commuting' as a whole and did not differentiate between cycling and walking. However, despite this limitation, their findings are likely to have some relevance for cycling. The conclusions of Davison et al. (2008) and Rice (2008), are also consistent with those of Steinbach et al. (2011) who commented that adult cyclists in London, were more likely to be affluent, with on average 1.5% of those in households earning under £15,000 cycling, compared to 2.2% of those in households earning over £35,000. These findings may recognise in part the ethical and aesthetic attitudes of those adults with greater income (as mentioned above in this section) and possibly also the ability to purchase a bicycle, which would also be relevant to children from low income families. Therefore in summary, as for ethnicity, the relationship between SES and rates of active commuting is difficult to disentangle from other social considerations. However, it is generally likely that rates of active transport are greater for children from families of both low and high SES, although the evidence mentioned above does not differentiate between cycling and walking. Due to the cost of buying and maintaining bicycles and the bourgeois sensibility of cycling in countries where cycling rates are low (Steinbach et al., 2011), it is likely high SES will be associated

with higher rates of cycling to school and low SES will be associated with lower rates of cycling to school in such countries.

3.2.5 Peers

Peers may influence the decisions of high school students to cycle to school due to peer pressure and also a desire to spend time with friends while travelling. As children reach adolescence, they spend more time with their peers and due to the formation of cliques and crowds, peer groups increasingly shape adolescents' behaviour (Bukatko, 2008; Youniss & Haynie, 1992). Pressure to conform is weak in early adolescence (10-12 years of age), peaks in mid-adolescence, and declines in late adolescence (17-22 years of age) (Youniss & Haynie, 1992). Consequently, it is likely the influence of peers with respect to cycling to high school will generally be lower in year 9, peak in year 11 and decline in year 13. Differences in gender may also be evident as discussed above in section 3.2.2.

The influence of peers on cycling to high school has not been widely considered in the literature. Two exceptions include research by Emond and Handy (2012) and Orsini (2005). Emond and Handy (2012) considered the relative influence of peers and parents using an ecological framework. They asked high school students in Davis, California, questions in relation to both their parents and their peers, and concluded peers had less influence over cycling to high school than parents. (The influence of parents is considered further in section 3.2.6. of this thesis.) In contrast, Orsini (2005) considered the influence of peers on cycling in relation to peer pressure and identified the influences and motivators for teenagers over the age of 16 in Vancouver who were eligible to drive, but chose instead to cycle. He concluded in countries where the percentage of secondary school students cycling was low, individuals were less likely to cycle if they were not comfortable having different views to their peers, and had not developed strong defence mechanisms against peer pressure. Such a situation would therefore be likely to apply in Christchurch.

The conclusions of Orsini regarding the importance of peer pressure can perhaps be explained by social identity theory which recognises that people who do not place great importance on group membership are more likely to distance themselves from a group by not conforming to group norms (Terry, Hogg, & McKimmie, 2015). Therefore, in places where

rates of cycling to school are low and cycling is not the norm, those students who rely less on a group for their self-identity are perhaps the ones who are more likely to cycle to school.

Social identity theory could also explain why adolescent girls cycle to school less than adolescent boys. Adolescent girls have less satisfaction with their body-image and value their appearance more highly than boys, and therefore have lower self-esteem (Simmons & Blyth, 1987). In line with social identity theory, girls may therefore be less likely than boys to distance themselves from group norms and therefore less likely to cycle in countries where cycling is not the norm.

The importance of subjective norms (what people ought to do) is recognised in both the TPB and the PWM and will be discussed further in the chapter 4. Conclusions regarding the importance of subjective norms are mixed, with Armitage and Connor (2001) considering subjective norms to be a weak predictor of behaviour, but Bamberg and Schmidt (2003) concluding subjective norms had a significant influence in relation to intention to use a car; with the caveat that these findings may have been specific to a university student population. Donald, Cooper, and Conchie (2014) also agreed subjective norms had a robust effect on intentions and habits, but considered this applied regardless of age. Given the importance to adolescents of pressure to conform, it is hypothesised in relation to this thesis that norms will be a strong predictor of behaviour for adolescent cycling.

Aside from norms and peer pressure, a desire to be sociable with peers may also influence whether children cycle to school. As children develop they spend less time with parents and more time with their peer group (Manning & Allen, 1987). This desire also influences their decisions regarding their travel choices, including cycling to school. Pooley, Turnbull and Adams (2005) recognised these needs in relation to travelling to school and concluded that for several participants in the UK aged 10-18 years (particularly girls) this was a more significant issue than road safety. While on the surface socialising may merely be seen as ‘a nice thing to do’, research also shows health outcomes are improved through the act of socialising (Holt-Lunstad, Smith, & Layton, 2010). Therefore, children’s desire for sociability while travelling is worthy of consideration for health reasons. The desire to be sociable with friends is also related to the influence of norms, as if a person’s friends all cycle, they will also be likely to cycle due to the influence of descriptive norms, and their friends will be supportive of them cycling due to the influence of the injunctive norm. The

motivations of sociability and norms are however very different, and the desire to be sociable when travelling to school is an important influence (Pooley et al., 2005).

3.2.6 Parents⁷

Parents can influence child cycling rates in various ways. Desire to keep children safe and be a ‘good parent’ in the eyes of others, can affect the lives of parents themselves and the way they influence their children. Many parents do not consider cycling to be safe and consider keeping their children safe to be an essential part of being a ‘good parent’. Research in Australia has shown this effect varies with the age of children, with parents being more concerned for younger children (e.g 5-6 years) compared to older children (10-12 years) (Timperio et al., 2004), and primary-aged children compared to secondary school children (Carver et al., 2013). As a consequence the most common alternative is to drive children to school (McDonald et al., 2011; Pooley et al., 2005; van der Ploeg et al., 2008). In doing so, however, parents may reduce their child’s ability to be independent, affect their child’s ability to bond with peers, limit their own work and travel choices, and make roads less safe for other children. Furthermore, by encouraging their children to drive, they may also be putting their children’s safety at risk and the safety of others using the road.

Parents may also influence their children through their own travel behaviour. In a study of children’s travel to soccer games, Tal and Handy (2008) found players whose parents cycled regularly were more likely to cycle to soccer games. Wen et al. (2008) also found year 4 and 5 children were less likely to be driven to school if their parents travelled to work other than by car.

3.2.6.1 Fear and ‘good’ parenting

The way children use their environment is to some extent controlled and influenced by their parents and in part directed by parental fears regarding traffic danger and abduction by

⁷ The term “parent” includes caregivers.

strangers (see section 3.4.2 below) – often referred to as ‘stranger danger’ (Tranter & Pawson, 2001).

In relation to their children’s movements and ‘strangers’ outside the home, parents’ fears have been documented for many decades. Notably, Hart (1979) recognised in Inavale, a small town in the rural US, parents’ fears of physical elements (e.g. busy roads) for children under eight years of age, the ‘bad influences’ of other children, and the fear of ‘outsiders’ upon the town for older children all affected the spatial ranges parents permitted their children to occupy. Matthews (1992) also recognised the effect of parental safety concerns on the spatial freedom afforded to children and Tranter and Pawson (2001) concluded parents in a less affluent suburb of Christchurch, were more concerned about the possibility of their children being assaulted or molested than they were of traffic danger⁸. Trust may be central to parents’ safety concerns – both in terms of the degree to which parents trust their children and also how much they trust other people in their community (Den Besten, 2010). Pooley et al. (2005) note parents’ perceptions of risk (fears of crime or assault) are often fed by national and local media (2010).

Some evidence suggests parents may also be more concerned for the personal security of girls than boys (Hart, 1979; McDonald, 2012). McDonald (2012), however, says while parental concerns about sexual molestation of girls limited their freedom in the 1970s, and parents perhaps intend (four decades later) to limit the freedom of high school girls, in reality, there are few gender differences in the travel patterns of high school boys and girls in the US. Some existing research shows contrasts in gender differences in travel patterns in the US, Australia, Ireland and the UK (Larsen et al., 2009; Leslie et al., 2010; McMillan et al., 2006; Nelson, Foley, O’Gorman, Moyna, & Woods, 2008; Panter et al., 2009), while other research in the US and the UK does not (Black et al., 2001; Kerr et al., 2006; Martin, Lee, & Lowry, 2007). (See also discussion in sections 2.2 and 3.2.2.) Differences in the freedom of girls and boys may also differ due to ethnicity as previously discussed in section 3.2.3.

Parents’ fears for their children’s safety are also founded in the society in which they live. This was recognised by Steinbach et al. (2011) who concluded that while parents’ fears for their children varied depending on the individual, they were also created within social settings influenced by the media, friends, family and wider society. Consistent with the

⁸ The children in this suburb also had the same view.

importance of trust as noted by Den Besten (2010), McDonald, Deakin, and Aalborg (2010) concluded in relation to 10-14 year olds in the San Francisco Bay Area, that parents were more likely to allow their children to walk or cycle to school when they perceived other people would watch out for their children. Weller and Bruegel (2009) also recognised the relationship between trust and the spatial freedom afforded to children. Therefore, parental perceptions of the social environment are likely to play a part in decisions regarding cycling to school.

Societal pressures of what is to be a ‘good parent’ influence children’s travel are particularly relevant with respect to how students travel to school, and change over time (Gill Valentine & McKendrick, 1997). While Valentine and McKendrick reported that middle class mothers in the UK felt pressure from each other to chaperone their children to and from social activities, they also reported working class mothers experienced pressure to give their children more independence. This concept has been examined and developed further by researchers in Australia and New Zealand (Tranter & Pawson, 2001; Tranter & Sharpe, 2012) with Tranter and Pawson concluding that in a more affluent suburb in Christchurch, a culture had developed where parents protected their children from dangers in the environment by taking away some of their freedom to independent access to their local environment (including travelling to and from school) and compensated for this by taking them to more places (usually by car). Similarly, Tranter and Sharpe (2012) concluded that parents who let their children walk or bike to school, or play in the street, were sometimes criticised or censured by other parents who believed good parents drove their children to school and other places. (Tranter even went as far as to say that such parents could be compared to the misfit robots in WALL-E who did not fit in with the conventional robots.) Therefore, unlike conclusions by Valentine and McKendrick (1997) and Tranter and Pawson (2001), research by Tranter and Sharpe (2012) did not identify pressures to let children be more independent, but instead the opposite, with a further change being that chaperoning and being a good parent had become about driving children rather than chaperoning by other means. Consequently, they concluded ‘chaperoning’ had become ‘chauffeuring’, and being a ‘good parent’ required ‘chauffeuring’.

To some extent parents driving children to school is linked to keeping children ‘safe’. Ironically, however, while parents driving their children to school makes roads safer (both in terms of traffic danger and ‘stranger danger’) for their children, in doing so the roads become

less safe for other children who walk or cycle to school. This is because the act of driving children to school, increases the number of vehicles on the road, reduces the number of potential cyclists on the road and decreases the number of eyes on the street (McDonald et al., 2010; Sloman, 2006). Furthermore, as Hillman et al. (1990) mention, more children cycling (or walking) gives parents more confidence to allow their children to do the same. A further effect of driving children to school may be to reduce opportunities for them to bond with peers (Prezza et al., 2001). Therefore, although the primary reasons many parents give for driving their children is to keep them safe, they may in the long term also be acting contrary to their children's, and other children's, interests.

3.2.6.2 Additional effects associated with parents

In addition to the effects on children of being driven to school, driving children to school also has potential effects on parents. As mentioned in section 3.2.6, car use is relevant as many trips by students to school that could be taken by bicycle are instead often taken as a passenger in a car, usually driven by a parent. Trip-chaining (stopping on the way to a destination) is often given by parents as a justification for driving students to school. However, Bradshaw and Jones (2000) found about a third of all car journeys to school are not in fact made in association with other journeys. As noted by Cairns et al. (2004) even where trip-chaining occurs, it is common for parents to change their route to take their children to school. A second consequence of driving children to school is that a parent's choice of travel by an alternative means may be curtailed as evidenced by research where parents gave the need to drop children to school as a reason for driving to work (Sloman, 2006). A third effect on parents is the opportunity cost in relation to time spent transporting children which could otherwise be spent in other ways. In some situations this can result in a reduction in employment opportunities and the adjusting of working hours to suit school start and finish times (Hillman et al., 1990) which may not always be in the best interests of a parent. Therefore overall, chauffeuring potentially has several adverse effects on parents. In recognition of this, parents in New Zealand sometimes encourage their children to learn to drive as soon as they are legally able to (Orsini, 2012), with consequent flow on effects in terms of reducing the percentage of children cycling to school.

Students who are old enough to get a vehicle licence sometimes also feel pressure from their parents to drive. In doing this, however, parents may fail to consider the safety of their children and others on the road. In a teen panel at a symposium on adolescent mobility (Orsini, 2012), students mentioned their parents had pressured them to get their car licences. The main reason students said their parents did this was to relieve the burden of driving them and their siblings to places such as school, after school activities and friends' houses. Some students also reported feeling guilty for not getting their licences. However, at the same symposium, Tranter (2012) concluded teenagers were involved in a greater proportion of vehicle accidents than any other age group and therefore the best way for parents to keep their teenagers safe was to delay them driving for as long as possible. Furthermore, the lack of driving experience and skill of teenage drivers, and increased traffic volumes resulted in a decrease in safety for other people using the road. Therefore, while encouraging children to drive, gives children a greater degree of independence, and frees up parents' time chauffeuring, it has consequences in terms of their children's, and other children's safety.

Although many people would assume parents' influence on high school students diminishes as students progress through high school, several researchers have found students' travel behaviour continues to be influenced by their parents through high school. Emond and Handy (2012) conclude this is due to the encouragement and behaviour of parents and whether parents provide access to a car. Similarly Hunter and Youniss (1982) expected the influence of parents would decrease with age but instead found perceived parental control continued to be important throughout adolescence and Mitra and Buliung (2015) concluded youth were still subject to the attitudes of their parents with respect to travel mode choice. Therefore, parents are likely to influence their children's travel choices throughout the high school years, particularly as (with only very rare exceptions) all children are likely to be living at home with at least one parent or caregiver (Pooley et al., 2005).

3.4 Behaviour setting

In addition to interpersonal factors, behaviour setting can also affect whether children cycle to school. Aspects of the setting that will be considered here are school selection and location, distance, traffic safety, personal security, urban form, route continuity and connectivity, the natural environment and the media. Justification for examining behaviour

setting is given by De Bruijn, Kremers, Schaalma, Van Mechelen and Brug (2005) who found for adolescents, factors such as the cultural and social environment, have a direct association with bicycle use for transportation.

3.4.1 Distance

Distance is often given as a reason for not cycling to school (Centers for Disease Control and Prevention, 2005; Thornton, Bunt, Dalziel, & Simon, 2010) and it is often associated with travel time and effort required, with greater travel time and effort required as distance increases (Heinen, Maat, & Wee, 2011). Factors such as age, gender, weather, terrain, fitness levels, enthusiasm for cycling, cycling environment and time constraints also influence the distance people will cycle. Research on barriers to cycling often recognises the importance of distance by way of controlling for distance. For example, Villanueva et al. (2012) limited their research on destinations and children's independent mobility to children who lived within 2km of their school. Most commonly, research participants are given the option of choosing an item such as "I live too far away from school to bicycle here" (Emond & Handy, 2012, p. 76), when asked about reasons for not cycling to school, however, it is also possible students may not cycle because they live too close to cycle. Unfortunately there is little research on minimum cycle distances, however, where research participants say it is too close to cycle, walking is likely to be the preferred transport option. Consequently, although there will be some overlap, it is relevant to consider how far people will walk. Previous research has found walking dominates at distances of up to approximately 1km (Rietveld, 2000; Yelavich et al., 2008). Therefore, a distance of less than 1km may be considered by adolescents to be too close to cycle. Reasons for preferring walking over cycling at short distances may include time required to lock, unlock and manoeuvre bikes and the location of school bike storage facilities relative to the location of a student's home, however, extant literature does not provide evidence of this yet.

Research on cycling rates and average maximum cycle distances, has been carried out with various age groups in different countries over the last few decades. The most relevant research completed in New Zealand was in 1991 with children aged 10 to 18 years-old in Christchurch (Christchurch Cycle Safety Committee & Transit New Zealand, 1991). In this research, the average distance ridden to school was found to be around 3km. Similar, results

were obtained in the US, where children in grades 6-8 (11 to 14 years-old) who lived more than 2.5 miles (4.02km) were found to be less likely to bike to school (Schlossberg, Greene, Phillips, Johnson, & Parker, 2006). Due to similarities in the transport environment in the US and NZ, it is likely the maximum distance adolescents in Christchurch will cycle will be similar to the US and will therefore be approximately 4km. Therefore, if all other conditions are favourable, it is likely adolescents in New Zealand will cycle between 1 and 4km.

3.4.2 Safety

Both traffic safety and personal security need to be considered with respect to safety concerns related to cycling. Traffic safety is often considered to be a factor influencing the decision of people cycling (Centers for Disease Control and Prevention, 2002; Pikora et al., 2003; Thornton et al., 2010; Villanueva et al., 2012). In relation to adults, Thornton et al. (2010) concluded safety concerns / 'too much traffic' was a key barrier to cycling for adults in the UK; and in Australia, Pikora et al. (2003) conducted interviews with key experts and found traffic safety (including speed and volume) was a key variable that influenced cycling. With respect to children cycling to school, researchers in the US have also concluded the main deterrents to cycling and walking in the US are distance and traffic danger (Centers for Disease Control and Prevention, 2005); and in Perth, Australia, researchers found living on a busy road reduced the independent mobility of both boys and girls aged 10-13 years-old (Villanueva et al., 2012).

Due to a general consensus that traffic safety has a major influence on whether children cycle to school (particularly for primary school students), many people consider the provision of facilities to separate cycles and motor vehicles to be a way to reduce this barrier. Evidence suggests some people also prefer to bike further on a cycle path than take a shorter route on the street with vehicular traffic (Shafizadeh & Niemeier, 1997). 'Build it and they will come' is a phrase often used in relation to separated cycle paths as a method to increase the percentage of people riding cycles (Birk & Geller, 2006; Cervero, Caldwell, & Cuellar, 2013). This phrase however needs to be carefully unpacked, as it may depend on what is built as to whether people will use it and who will use it. For example, if a cycle path is built alongside a motorway, this may attract commuters who want to travel at high speeds but not groups of retirees who wish to ride for recreational purposes at slower speeds with numerous

pleasant stopping points. It has however been concluded that separated cycle paths may be particularly useful in attracting potential cyclists (Kingham, Taylor, & Koorey, 2011). As discussed above, however, perceptions and reality may differ, and with respect to cycle paths, while people may perceive them to be safe, they may not always be safe, particularly at intersections with vehicular traffic (Krizek et al., 2009) – a factor also recognised by Kingham et al. (2011), who stipulated cycle paths with dedicated intersection facilities were a good option to attract potential cyclists.

The wearing of cycle helmets is another factor that may influence parents' and children's perceptions of safety in relation to cycling. Although the wearing of helmets is not a legal requirement in many countries in the world (particularly for adults), they have been legally required in New Zealand since 1994 and in Australia since 1991. Horton (2007) argues legislation requiring helmets to be worn reinforces the image of cycling as a dangerous activity. This is reinforced by Rissel, Campbell, Ashley, and Jackson (2002) who concluded that people with less cycling experience tend to think cycling is more dangerous than those with more cycling experience.

The advantages and disadvantages of wearing of helmets also need to be considered. Researchers such as Rissel and Wen (2011) consider helmets should not be compulsory on the grounds that wearing of helmets has more disadvantages than advantages. Taylor and Scuffam (2002) also considered the costs in terms of different age groups and found costs did not outweigh the benefits for those over 13 years of age. Reasons given for these conclusions are that more people are dissuaded from cycling altogether due to the need to wear a helmet, and the health disadvantages of this outweigh any potential health benefits of wearing a helmet. An associated effect is that cycle safety is improved in places where the number of cyclists is greater (Jacobsen, 2003). Therefore, where helmets adversely affect the numbers of people cycling, cycle safety will also be affected and the number of people cycling will decline even further. Others have also argued cycle helmets do little to protect users (Voukelatos & Rissel, 2010).

Consideration of cycling rates before and after the introduction of helmet laws may shed some light on the effects of these laws. In 2006, Land Transport NZ reported the number of cycling trips decreased by 51% between 1989-1990 and 2003-2006, possibly due to perceptions that the environment for cycling was less safe and less convenient (Land Transport New Zealand, 2006). Rissel and Wen (2011) suggested these changes were linked

to the change in helmet laws in 1994. They also concluded that in Sydney, younger people and those who rode occasionally reported the highest likelihood to ride more if they did not have to wear a helmet. This is likely to also be relevant in NZ and may perhaps explain why the NZ Census showed cycling to work rates dropped far more for the 15-19 year-old age group, than for any other age group between 1991 and 2006 (Tin Tin et al., 2009). Further research would be required to confirm this link.

Aside from the legal requirement, the effectiveness of campaigns and social pressure to encourage cyclists to wear helmets has been very successful (Fagan, 2014), the wearing of helmets has been drummed into people, particularly since they became mandatory. In a story in the Sunday Star Times, Clinton Trass of the New Zealand cycling enthusiast group Cycling Health, even went as far as to say:

That fear campaign has been too successful. If you're talking to the average New Zealander about riding in the city, you get some pretty incredulous looks. They would think it's almost certain death (Fagan, 2014, p. np).

Similarly, Mullan (2014) in research on drivers, teenagers, danger and tolerance in Ireland, concluded people had an overarching obsession with safety, and cycling without a helmet was viewed as a highly irresponsible and dangerous pursuit.

Some researchers have distinguished between perceived traffic safety and actual traffic safety (McMillan, 2007; Pikora et al., 2003). Pikora et al.'s research was conducted with key experts and assessed actual safety based on traffic speed and traffic volumes. However, where people other than experts are the subject of research, it may be difficult to distinguish between perceived safety and actual safety. This is shown in findings by Cho, Rodriguez, and Khattak (2009) who concluded higher actual crash risk increased perceived crash risk, but higher perceptions of risk reduced actual crash rates as behavioural changes occurred. Contrary to this, Rietveld and Daniel (2004) concluded actual risks were more important than perceived risks with respect to bicycle use and walking. However, for the purposes of this research, consistent with Cho et al. (2009), perceived safety will be the primary consideration.

Perceptions of safety vary from person to person. Therefore when considering perceived safety another issue to consider is whose perception is being evaluated. Based on research

mentioned in section 3.2.6 regarding the continued role of parents with respect to adolescents' travel, it is reasonable to conclude that the perceptions of both parents and adolescents are important. This conclusion is supported by research by Lorenc, Brunton, Oliver, Oliver, and Oakley (2008) who concluded fear and dislike of local environments by both children and parents influenced children's transport choices. In general, however, research has focussed on the perceptions of caregivers rather than children. This could be partly because much of the research concerning children's travel to school focuses on children in their first 7 years of school, or possibly because the perceptions of caregivers are more influential than the perceptions of their children. An example where the perceptions of caregivers were found to be influential, and where perceived safety was more influential than actual safety, is found in research by McMillan (2007) who concluded caregiver's perceptions of neighbourhood safety and traffic safety in relation to 3rd-5th grade (8-12 years-old) children in the US, were more influential on a child's travel mode than actual traffic safety and aesthetics. Kerr et al. (2006) also concluded parental concerns most strongly explained levels of active commuting in children ages 5-18 years. Therefore, while some consider the perceptions of safety by both children and their parents are important, the perceptions of parents or caregivers may be more important.

In addition to people's perceptions of their physical environment, people are also influenced by their perceptions of the social environment. The social environment includes peer, parent and community influences (Emond & Handy, 2012). For example, in a study on the influence of the social environment on children's school travel in the San Francisco Bay Area, McDonald et al. (2010), concluded fear of local environments could be influenced by the degree to which parents believed other adults in the area were watching out for and monitoring children. Therefore, in this example it was found that caregiver's perceptions of safety in relation to the social environment influenced children's travel. Furthermore, as mentioned above in section 3.2.6, Weller and Bruegel (2009) examined the role of children in building social networks, trust and neighbourliness in the UK and found children living in London (regardless of poverty levels, racial composition or recorded crime rates) were allowed greater spatial freedom than those in other parts of the UK. They attributed this to local parenting norms, in addition to parents' and children's experiences and perceptions of trust in an area.

When considering safety in relation to cycling, research has shown in addition to traffic safety, crime or personal security are also relevant (McMillan, 2007; Pikora et al., 2003). Crime or personal security relates primarily to safety in relation to abduction or harm by strangers, often referred to as ‘stranger danger’. With respect to children, the issue of stranger danger is predominantly discussed in term of parents’ perceptions (as discussed in section 3.2.6) however children’s perceptions of stranger danger may also be relevant, but are not evident in the literature with respect to cycling to school.

Therefore overall, safety both in terms of perceived and actual traffic safety and personal security affects whether teenagers cycle to school.

3.4.3 Urban form

Travel behaviour has been linked to many different characteristics of urban form; density, diversity and design (Cervero & Kockelman, 1997), as well as destination accessibility, land use mix, street pattern, pedestrian attractiveness and safety (Saelens & Handy, 2008).

McMillan (2007), however, concluded urban form may have less influence on how children travel to school compared to factors such as perceptions of neighbourhood safety and traffic safety, household transportation options and social/cultural norms. Furthermore, in research in Canada, Mitra and Buliung (2015) concluded mixed land use and smaller blocks influenced walking to school for children aged 10-11 years, but for youth aged 14-15 years, there was little correlation with the built environment.

As previously, mentioned in section 3.1, and recognised by Pikora et al. (2003), the aspects of urban form that are relevant for walking may differ from those relevant for cycling.

Specifically, Pikora et al. (2003) found issues related to personal security, attractiveness of streetscape and the presence of destinations were important for walking but continuous route and traffic safety were important with respect to cycling. Based on conclusions of McMillan (2007), Mitra and Buliung (2015) and Pikora et al. (2003), it is reasonable to conclude urban form does not have a large effect on the number of children cycling, with the exceptions of continuous route and traffic safety. As traffic safety has already been discussed above in 3.4.2, the importance of a continuous route and the associated provision of cycle infrastructure will now be considered.

3.4.4 Route continuity and connectivity

Route continuity and the connectivity of roads are interrelated and are determined by the design of transport infrastructure. For a route to be continuous it requires there to be no intersections to eliminate the need to stop. Connectivity concerns the directness of route. Key experts state an important variable that influences cycling is the number of stops cyclists are required to make (Pikora et al., 2003). Starting requires energy or effort, and so becomes a barrier for many when cycling (Parkin, Ryley, & Jones, 2007). Parkin et al. (2007) note the amount of effort required is “the result of the combination of the mass of the rider and bicycle, the rotational mass of the wheels, the gradient, the rolling and air resistances and the mechanical efficiency of the bicycle” (2007, p. 75). Therefore, in addition to distance (as discussed above in 3.4.1 Distance) factors such as hilliness, wind speed, bike type and the type of cycling surface all affect the effort required. Starting en route adds to this because effort is needed to regain momentum after coming to a stop. Therefore, the more continuous a route, with fewer stops and starts, the more attractive it will be for cyclists.

Connectivity refers to the density of the road network connections and the directness of routes. It is high where there are many links; many intersections; and few deadends. (Therefore, routes with many intersections that rate highly in terms of connectivity, may not rate highly in terms of continuity.) As connectivity increases, the distance people must travel between locations decreases and their options of route choice increase (Victoria Transport Policy Institute, 2014). If distance has a major influence on whether people walk or cycle, then if roads are better connected and routes more direct, common sense suggests people will be more likely to walk or cycle.

Some researchers have found counter-intuitively, however, that children are less likely to cycle to school in areas where the density of streetlights and roads is greater (Panter, Jones, Van Sluijs, & Griffin, 2010). Timperio (2006) and Braza, Shoemaker, and Seeley (2004) also found that children were less likely to walk or cycle to school if their route to school was direct or where there were a higher number of intersections per street mile. Van Dyck, Cardon, Deforche, and De Bourdeaudhuij (2009) also found in Belgium that adolescents living in less walkable neighbourhoods with greater distances to school walked more. Timperio et al. (2006) hypothesise that, unlike adults, when it comes to walking and cycling

children may not be strongly influenced by travel time, but instead by concerns about traffic safety. A further possible reason could relate to a desire for sociability with peers, as discussed above in section 3.2.5, as students may wish to take a longer route to enable them to spend more time with their peers. Further study would be necessary to investigate more thoroughly the link between continuity, connectivity and children's walking and cycling. Bearing in mind that different factors influence walking and cycling, it would also be prudent to investigate cycling and walking independently.

3.4.5 Natural Environment

Aspects of the natural environment can also influence whether students choose to cycle to school. This includes topography, weather and climate. As mentioned above, topography or hilliness influences cyclists, as the hillier a cycling route, the more effort is required by cyclists (Parkin et al., 2007). Other researchers have also found hilliness to influence bicycle use. Rietveld and Daniel (2004) found the amount of cycle use in the Netherlands was related to the physical environment; in particular, altitude differences, city size and population features such as the proportion of young people. They concluded cycling rates were low in Maastricht and Heerlan (in the south-east) due to the hilly topography of these cities. Rodriguez and Joo (2004) also found that in North Carolina, local topography and sidewalk availability were associated with walking and cycling. However, Rietveld and Daniel's research was based on adults and not high school students and Rodriguez and Joo were primarily interested in the impact of the local physical environment on mode choice. Consequently, it is difficult to extrapolate these results when considering the wider influences on students cycling to school in Christchurch. In contrast, (Timperio et al., 2006) found that while the presence of a steep incline en route to school affected walking and cycling for younger children (aged 5-7 years) in Melbourne, it did not affect commuting by children aged 10-12 years. Therefore, hilly topography may influence high school students cycling to school, however, the degree of influence in the wider context needs more research. Given that Christchurch is predominantly a flat city the influence of hilliness is however likely to be small.

The term 'weather' refers to short-term weather conditions and 'climate' refers to long-term weather. Weather conditions can include rain, wind and temperature. Of these three factors,

rain is concluded to be the most negative aspect of the weather in relation to bicycle commuting (Heinen et al., 2011). Nankervis (1999) researched the effect of weather and climate on bicycle commuting by university students in Melbourne, and concluded neither weather nor climate were a great deterrent to students and that the perception of weather as a deterrent was greater than its actual deterrent. He did however, recognise that university students were an atypical group and the transfer of the results to other groups should be done with caution. Christchurch has a moderate rainfall with mean daily maximum air temperatures ranging from 22.5 °C (73 °F) in January to 11.3 °C (52 °F) in July. Given these facts, it is unlikely weather and climate will have a major influence on decisions by Christchurch high school students regarding cycling to school.

3.4.6 School selection and location

In some places around the world children have a choice of schools and in some they do not and are heavily encouraged to attend the local school. In New Zealand, there are several different types of schools. These include state (public) schools, private schools, state-integrated schools (e.g. religious schools) and alternative schools (e.g. charter schools, correspondence school). Some state schools apply zoning to limit student numbers but may accept a limited number of students from out of zone. State-integrated schools, private schools and alternative schools do not have zones. Decisions made at a policy level concerning the imposition of zones, the ability for parents to select schools and the location of schools affect the number of children walking and cycling to school (Sirard & Slater, 2008; Timperio et al., 2006). Specifically, where parents have a choice of schools, students usually travel further to reach schools of their choice and therefore due to the distances involved, walking or cycling is not a viable option. Examples of research on this issue include that of De Bruijn et al.(2005) who found secondary students in the Netherlands were three times more likely to bike to school than vocational students⁹ as there were fewer vocational schools than other secondary schools in the Netherlands, and consequently on average students had to travel further to reach vocational schools. Similarly, in the US, it was

⁹ In the Netherlands children have the choice of three different types of schools at secondary level: one type of school offers both vocational training and theoretical education and the other two offer higher general and preparatory scholarly education.

found that ‘magnet schools’ and ‘school choice’¹⁰ schools drew from larger geographic areas than schools where children were required to attend the nearest ‘neighbourhood’ school and consequently walking and cycling rates were lower to these schools (Wilson, Marshall, Wilson, & Krizek, 2010). This trend has also been found in Switzerland where there is no school choice and 95% of Swiss children attend public schools. Consequently children travel relatively short distances to school (Grize et al., 2010) and the percentage of children walking and cycling to school is high in comparison with the US, Australia, Canada and the UK. Overall, it can be concluded that policies regarding school selection affect rates of cycling to school.

In addition to policies regulating school choice, policies regarding school siting can also influence active travel to school (ATS). This can be in relation to the building of new schools or in the closure or merger of existing schools. In New Zealand, there has been a progressive closure of small schools across the country since the 1990s (Witten, Kearns, Lewis, Coster, & McCreanor, 2003) and in Christchurch, schools have been closed and merged following the Christchurch earthquake sequence of 2010/2011 (Ministry of Education, 2013). Consequently, children who previously attended schools which have been closed, with perhaps rare exceptions, are required to travel further to school. Similarly in the US, rules requiring large amounts of land per student were relaxed as they resulted in the location of schools on the fringes of towns, with limits on school design and location, increases in commuting distances and consequently lower walking rates (McDonald, 2008). In contrast, in Japan, elementary schools are required by law to be no more than 4 kilometres, and for junior high school, no more than 6 kilometres from a child’s home (Mori, Armada, & Willcox, 2012). Consequently, in addition to policies regarding school selection, policies regarding school location affect rates of cycling to school.

3.4.7 Media

The way cycling is portrayed in the media can influence students’ decisions to cycle to school. All types of media may have an influence including social media, TV shows, advertisements, newspapers, on line sources, radio and film. At times, even campaigns by

¹⁰ ‘Magnet schools’ and ‘school choice’ schools are schools people choose to attend. The students who attend these schools are not controlled through any geographical considerations.

government to ostensibly achieve good societal outcomes, portray cycling in a bad light. For example, an advertisement by the Victorian Government about road rage, “Road use or road abuse”, was intended to make people realise it was not appropriate to act aggressively to others when on the road (Victorian Government, 2014, p. np). The advertisement, however, showed a motorist and a cyclist arguing and depicted both as rude and arrogant (Victorian Government, 2014). Given cyclists are a minority on the road in Australia and much more vulnerable than car drivers, this advertisement was heavily criticised by cycle advocates as it implied all cyclists were ‘Lycra louts’. A further example of this was a series of advertisements, creatively entitled “*Lose your licence and you’re screwed*”, by the Motor Accident Commission (MAC) in Australia to encourage people to drive in accordance with the law (Motor Accident Commission & Government of South Australia, 2014, p. np). The poster for this advertisement showed a young couple dressed for a formal occasion on a bicycle (see Figure 11 below). The choice of helmets and bicycle and the child seat for the young woman clearly implied it was not cool to travel by bike. In another advertisement in the “*Lose your licence and you’re screwed*” series, two young men look admiringly at three young women in a car, but are snubbed by the girls (unfortunately this advertisement is no longer publicly available). The subsequent shot reveals the men are riding an old 16 inch wheel tandem bike, carrying a ghetto blaster, and wearing unfashionable clothes and helmets. The women then give the men disapproving looks and drive away laughing in their car. A spokesman for MAC said “*past campaigns had emphasised physical threats to drivers. This approach poses a social threat. We are trying to highlight to young people that if you do lose your licence, you face the embarrassment of ... taking your girlfriend out on your bike or may even lose your job*”. An effect therefore of the MAC advertisement being to deride cycling.



Figure 11: Advertisement from Motor Accident Commission and Government of South Australia

Research in Europe has also found the media to portray cycling in a negative light and car travel in a positive light. In a study of the online press in Italy, Rimano et al. (2015) found three sets of meanings associated with cycles. These concerned risks and dangers; benefits to the environment and the individual; and the social and personal benefits of cycling. Although they did not fully assess whether all these issues were reported in a negative or positive light, they concluded road accidents and physical assaults were over-represented in the press. Penalosa (2011) also found with respect to the Barclays Cycle Hire scheme that newspapers in the UK gave a biased perspective of cycling as dangerous, and focussed on bad news associated with cycling as it was more newsworthy. In relation to the role of advertising and the car, Stokes and Hallett (1992) concluded media influences children from a very early age such as in shows like Postman Pat and the Love Bug. They also concluded as children grow older, media showing youth cultures that revolve around cars such as the movie Grease, and the US sitcom Happy Days have an influence. In relation to movies, and in keeping with social cognitive theory (Bandura, 2002), Behm-Morawitz and Mastro (2008) suggest the more consumers identify with particular movie characters, the more likely they are to adopt the attitudes, beliefs and behaviours shown in these movies. Therefore, if youth culture is shown to revolve around the car, it is likely adolescents will adopt these attitudes. All forms of media are most likely to reflect the dominant culture in a country. Therefore, in countries such as the US and New Zealand where cycling rates are low, it is more likely car culture will dominate rather than bicycle culture. This effect is accentuated as the majority of movies viewed in New Zealand are made in the US which has the highest percentage of trips taken by automobile in the world (Bassett, 2008).

3.4.8 Additional factors

Other aspects of behaviour setting may also affect students' reasons for not cycling to school. Although it is possible to explore the influence of a large variety of aspects of the behaviour setting, researchers tend to focus on those they consider to have the greatest influence. For example, Emond and Handy (2012) investigated the influence of a safe bike route, living a long distance from school, a direct bike route and easy to use bike parking areas at a high school in Davis in the US. Of these variables, they concluded only distance was significant and a strong deterrent to cycling. Sirard and Slater (2008) also concluded distance, in addition to traffic safety, were the most important variables associated with active travel to school and

McDonald, Deakin and Aalborg (2010) considered distance and social environment were key variables. Consequently, matters such as having too much to carry, having other places to go before or after school, not having a bicycle, not having a 'nice' bicycle, a lack of cycle skills, a lack of skill to cycle on the road, facilities provided at school, the existence of cycle teams and encouragement by school policies or practices are not likely to have a significant influence on whether students cycle to school. In support of these conclusions, Heinen et al. (2011) also considered the range of factors that affected mode choice for adults commuting and concluded 'attitude' had the greatest influence, people's social environments were also important, and aspects of the physical environment were of less importance. Consequently, detailed examination of additional factors that may affect some students' decisions to cycle to school is not considered necessary.

3.4.9 Transport cultures

In many countries with high rates of car use and low rates of cycle use, such as the US, UK and Australia, the car is integral to people's daily lives. This is recognised in the UK where cars form part of the identities of individuals, organisations and the wider culture (Skinner & Rosen, 2007). Dowling (2000) gives an example of this in her research in Sydney where she concludes car use is instrumental to the identity and values of suburban mothers and collective notions of being a 'good mother'. Even at six weeks old, babies have been described as automobility wired and as Sheller (2004, p. 227) reports:

It is clear that infants take pleasure in the kinaesthetic experience of the car ride, and develop an early orientation towards four-wheeled mobility within a car culture that soon enables them to play with toy cars, ride on child-sized cars, and learn to identify different kinds and brands of motor vehicles by the age of 2 years.

Similarly, notions of 'good parenting' in New Zealand are aligned with use of the car (Tranter & Pawson, 2001) (see also section 3.2.6). In contrast, in Utrecht, in the Netherlands, Schwanen (2011) reports notions of good parenting aligned with the bicycle rather than the car. Therefore, the wider culture influences notions of what it is to be a 'good parent'.

Rates of cycling to school in New Zealand would increase if cycling was to have a greater, and more normal, part in NZ culture. In examining how car use has become entrenched in the

daily lives of most Australians to the point where Australia is now a car-reliant society, Hinde and Dixon (2005) conclude it is necessary to move beyond simple assumptions about behavioural settings and consider the dynamic interplay of historical, social, economic, structural, political and environmental processes that shape our lives. Garrard et al. (2006) also conclude such a multiple level approach is required in order to create a cycle culture.

The creation of cycling cultures is happening around the world to varying degrees in various countries. An example of this is Vancouver, Canada, where since 2009 multiple approaches have been used to effect change (Bruntlett & Bruntlett, 2014). Approaches include the development of a regional cycling strategy, construction of protected bike lanes, provision for bikes on buses and the creation of 30km/hr slow roads. As a result, a bike culture has developed with streets formerly designed for vehicles occupied by both men and women of all ages, abilities and backgrounds on ‘Dutch-style’¹¹ commuter bicycles. This has resulted in an increase in the number of people riding for utility, rather than exercise, with people cycling at slower speeds over shorter distances. The clothing of cyclists has also moved away from cycle-specific clothing to more everyday clothing. Helmet use has decreased due to the provision of safe, separated infrastructure. A further consequence has been an increase in the number of children cycling to school, sometimes with parents, and an increase in the number of cargo bikes on the streets for transporting children, groceries, pets, supplies and freight. Social spin-offs have also resulted through an increase in organised and group rides. Businesses have benefited financially through hotels offering bike rentals and valets, etc. and the city hopes to benefit by attracting more tourists to cycle in the city, and offering visitors a unique, intimate, and personal way to experience the best of the city.

Such trends may also be occurring in NZ. This could be assessed partly through assessing the types of bikes sold. Trends in bike sales were considered by Smith, Wilson and Armstrong (2011) in their report on how to encourage the use of bicycles for short trips in NZ. At the time, they concluded the NZ bicycle retail market did not reflect the markets of overseas where commuter style bikes dominated. Further research would be necessary to confirm whether trends in bicycle sales in NZ have changed since Smith et al.’s report was published.

¹¹ ‘Dutch Bikes’ are defined as being those bikes with an upright/comfortable riding position, a fully enclosed chain/chaincase, internal hub gears, internal hub brakes, full fenders, a heavy duty frame, generator-powered lights, built-in lock, sturdy parking stand and strong/durable wheels (My Dutch bike, 2015, p. np).

3.4.10 The wider transport policy environment

The wider transport policy environment can also affect rates of cycling to school. Such policies include central and local government transport and land use policies, funding and media regulations, advocacy by individuals and organisations and cycle helmet regulation. In a comparison of the school transport in the wider transport context of Zurich, Munich and Melbourne, Somers and Stone (2015) found children's independent travel was planned for in Munich and Zurich, but not in Melbourne. Similarly in New Zealand, guidelines exist for schools on safer journeys to school (New Zealand Transport Agency, 2014) but no nationwide programmes to achieve safe routes to school exist, and children's independent travel is not a priority of local or central government. While it is recognised that the wider transport policy environment has an affect on cycling rates of adolescents, due to a need for containment, this thesis instead concentrates on the intrapersonal factors and behaviour setting.

3.5 Conclusions

In conclusion, existing literature has identified that in countries where cycling rates are low, cycling decreases for older age groups and fewer females than males cycle. Adolescence is also likely to result in lower rates of cycling amongst high school students, particularly girls. Additionally, ethnicity and socioeconomic status play a part, although it is not always easy to disentangle the two social considerations. Linked to adolescence, peers also play a role, and contrary to what some might believe, parents continue to influence older children's travel choices, with some positive and some negative consequences. Media also influences the attitudes of teenagers, and reinforces the dominant transport culture. The physical environment also affects whether children cycle to school, particularly in terms of distance, traffic safety (including bike infrastructure, traffic volume and speed), continuity and connectedness (Heinen et al., 2011). The Ecological Model of Cycling for Transport to School, as shown in Figure 10, highlights the mutually interactive nature of the different elements that influence cycling for transport to school (e.g. interactions between the social and physical environment) – a feature that is integral to the model. At a policy level, this research concludes that policies concerning school selection and location affect distances to

school which in turn affect rates of active travel to school. The policy environment also affects cycling rates, in particular policies on school selection and location.

Chapter 4: Theoretical drivers of the choice to cycle to school

4.1 Introduction

People's behaviour is affected by many different factors. It is useful to identify ways to predict behaviour where it is in the public interest to change people's behaviour. For example, in 1997, the National Institute of Health organised a conference attended by a range of behavioural change theorists to identify ways to promote HIV- preventative behaviours (Conner & Norman, 2005; Fishbein, 2000). Analysis of the factors influencing behaviour change is also relevant when considering cycling to school by teenagers.

This chapter examines the modelling of behaviour change and ways to explain and predict it. It focusses on two specific theories: the Theory of Planned Behaviour (TPB) and the Prototype/willingness model (PWM), as they have been used respectively to explain and predict travel behaviour and the behaviour of adolescents. The combined use of the two theories is also considered.

To understand theories and models used to explain behaviour change, it is first useful to consider the origins of the modelling of behaviour change and how this has evolved since the 1950s.

4.2 The modelling of behaviour change

The modelling of human behaviour started with economic theory, where the individual was seen as a rational 'utility maximiser', operating through self-interest. A number of theorists recognised however that not all human behaviour was rational and an understanding of psychological processes could also make a useful contribution to its explanation.

The concept of 'bounded rationality' was developed by Simon (1957) to recognise that due to uncertainties about the future and the costs of obtaining information about the present, people's ability to make rational decisions is limited. These uncertainties could include those related to the environment, as often people will not be aware of the impact of their actions on

other places or in the future. For example, in the past when consumers purchased refrigerators containing chlorofluorocarbons (CFCs) they did not realise the effects CFCs had on the ozone layer. In recognition of the uncertainties that exist in decision-making, Simon developed a model of 'bounded rationality'. This model recognised people make decisions that may not be optimal but instead are based on the best information they have.

Psychologists such as Tversky and Kahneman (1974) furthered this thinking through their consideration of decision-making under uncertainty. As a consequence, researchers such as Kahneman and Frederick (2002) and Stanovich and West (2000), recognised cognition associated with decision-making as a dual process. Stanovich and West came up with a process they called System 1/System 2 cognition where System 1 recognised intuition and System 2 reasoning. Intuitive responses involved fast, automatic and effortless responses that people were often not conscious of. Reasoned responses were those that were deliberative, effortful and slow and which generated explicit judgements. The recognition of two processes at work is relevant when considering why students do not cycle to school as it is likely that a combination of both intuition and reasoning affect this decision. Consequently, further consideration of models that include both these types of processes is appropriate.

Models based on reasoning and rational choice result in linear models of behaviour. In a simple linear model, information may generate knowledge, which in turn affects attitudes and leads to a behaviour (Kollmuss & Agyeman, 2002). Linear models of decision-making have been developed further by psychologists. At a basic level, such models recognise a person's beliefs and values about a behaviour, and contribute to attitudes toward that behaviour. An example of a slightly more complex model is Fishbein and Azjen's Theory of Reasoned Action (TRA) (Fishbein, 1979). This model recognises the influence of evaluative beliefs about the consequences of a behaviour and normative beliefs, about how others would view performance of a behaviour, together with motivation to comply with these views. It then recognises that these values lead to attitudes towards a behaviour and subjective norms (what people ought to do), which in turn influence behavioural intention, and subsequently behaviour. Intentions occur due to the combined motivations that influence a behaviour and are an indication of the willingness of people to engage in a behaviour.

4.2.1 The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) (Ajzen, 1991) represents an extension to the TRA. It asserts that behavioural intentions determine behaviour, and that these intentions are influenced by three independent variables: attitude, subjective norms and perceived behavioural control (PBC) (see Figure 12). Therefore the principle difference between the TRA and the TPB is that, in contrast to the TRA, the TPB recognises perceived behavioural control as a contributor to intentions and behaviour.

Perceived behavioural control concerns the perceived ease or difficulty of engaging in a behaviour. These matters include those related to both self-efficacy and controllability (Conner & Sparks, 2005). Matters concerning self-efficacy refer to people's perception of the difficulty of performing a behaviour (Gummeson, Jonsson, & Conner, 1997). An example, in relation to cycling, is a student's perception of how difficult they think riding a bike to school would be for them. Controllability refers to the degree of control a person perceives they have over performing a behaviour (Gummeson et al., 1997). For example, when cycling to school, whether students make the decision independently about whether to cycle to school or whether others (such as parents) also make this decision.

Attitudes are influenced by a person's beliefs about outcomes and their evaluation of the outcomes of a given behaviour. Therefore, in relation to decisions about whether to cycle to school, if a person thought they would be injured in an accident as a result of cycling to school, this belief would then influence their attitude to cycling and subsequently affect their intentions and their behaviour as they may choose not to cycle to school.

Subjective norms (what people ought to do) are defined as perceived social pressure to act in a certain way. In a meta-analysis of the efficacy of the TPB, Armitage and Conner (Armitage & Conner, 2001) concluded for adults, attitude and perceived behavioural control were stronger predictors of intention than subjective norm. It has been argued that this occurs as subjective norm has less influence on intentions (Ajzen, 1991). The applicability of the conclusions to teenagers should be treated with caution. However, if the findings of Armitage and Connor apply in relation to cycling to school by teenagers, it is likely that attitude to cycling and perceived behavioural control will be stronger predictors of this behaviour than subjective norm. Some researchers have however argued that the narrow definition of

subjective norm under the TPB may play a part (Armitage & Conner, 2001). This is discussed below in section 4.2.3.

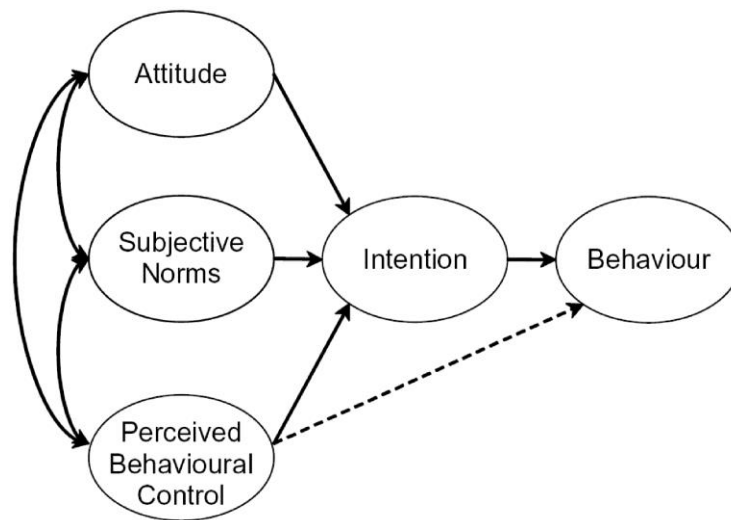


Figure 12: The Theory of Planned Behaviour (Ajzen, 1991)

The TPB has been used to analyse a range of behaviours including maintenance of physical activity (Armitage, 2005), explaining pro-environmental intention and behaviour (Harland, Staats, & Wilke, 1999), and examining young adults' social drinking (Zimmermann & Sieverding, 2010). It has also been used to analyse a range of travel behaviour, including car use (Abrahamse, Steg, Vlek, & Gifford, 2009), the choice of travel mode and the roles of past behaviour, habit and reasoned action (Bamberg, Ajzen, & Schmidt, 2003), the prediction of travel behaviour (Bamberg & Schmidt, 2003; Forward, 2000), bicycle helmet use by teenagers (Lajunen & Räsänen, 2004) and the identification of people who might switch their travel mode away from individual car use (Anable, 2005). This research has often compared the influence of variables of the TPB with variables from other behaviour change models e.g. the Norm Activation Model (Abrahamse et al., 2009), Triandis' Model of Interpersonal Behaviour and the Health Belief Model (HBM) and the Locus of Control (LC) (Lajunen & Räsänen, 2004). Overall, other researchers have found that although the variables of the TPB do not explain all behaviours, it is a useful framework for predicting travel behaviour. It is therefore concluded the TPB is a useful framework for predicting cycling behaviour.

4.2.2 Social Identity Theory, the Theory of Interpersonal Behaviour and the Transtheoretical Model

The importance of norms and associated with this, identity, has been recognised in other theories. Notably, Social Identity Theory, developed by Tajfel and Turner (1979), attempts to explain why individuals associate themselves with groups. It includes two processes: categorisation and self enhancement. Categorisation is the process by which individuals' identify themselves with people similar to themselves within a group and differentiate themselves from people outside the group. Self-enhancement is the process by which individuals favour those within their group and promote themselves relative to others. In relation to cycling to school, students who cycle to school may associate themselves with others that cycle to school and differentiate themselves from anyone who walks to school. They may also favour and promote others that cycle to school. Consequently, some consideration of Social Identity Theory is appropriate.

The TRA has also been extended through the consideration of habit and routine, and consequently the Theory of Interpersonal Behaviour (TIB) (Triandis, 1979) was created. The TIB is similar to the TRA as it recognises the contribution of attitudes and social factors (influenced by norms, roles and self-concept). It differs however from the TRA as it recognises the additional contribution of affect (i.e. emotions), habits and facilitating conditions. Therefore through the inclusion of habit, the TIB recognises decision-making is not solely based on reasoning and is essentially a dual process model, as both habits and intention are assumed to contribute to a behaviour.

The relative predictive ability of the TIB and the TPB may depend on the type of activity. For those activities where habit plays a significant part in decisions to engage in it, TIB may be better able to predict outcomes, whereas for activities where habit plays less of a role, the predictive ability of the TIB may not be as predictive. In relation to transport, research has shown car use is determined by intention and habit, whereas use of public transport is influenced solely by intention (Donald et al., 2014). The influence of habit on car use would then support Bamberg and Schmidt's (2003) research on university students' car use where they found the TIB to be more predictive of this behaviour than the TPB. Habit has also been found to be important in relation to adult cycling (De Bruijn, Kremers, Singh, Van den Putte,

& Van Mechelen, 2009). To determine the appropriateness of the use of the TIB in relation to cycling to school, further research would be needed to determine the role of habit in relation to this behaviour. Consequently, although at this time, the use of the TIB is not considered appropriate for this research, it may be useful for future research.

Behaviour change has also been explored in relation to stages of change. A model widely cited is the Transtheoretical Model (TTM) as developed by Prochaska and DiClemente (1982). This model recognises five principle stages affecting people's intention to perform a behaviour as follows:

1. Precontemplation – people do not intend to take action in the next 6 months.
2. Contemplation – people intend to take action in the next six months.
3. Preparation – people intend to take action in the next month.
4. Action – people have made or are making changes to their behaviour. Usually this has begun in the previous six months.
5. Maintenance – people have sustained their behaviour change for more than 6 months and intend to continue with the behaviour.

Forward (2014) explored the relevance of the TTM in relation to people's willingness to bike. She found people at the maintenance stage of the model cycled without reflecting, whereas for those at the action stage, cycling was much more deliberated. Consideration of the TTM may be useful in this research when comparing locations where students cycle to school and those where they do not. In locations where many students cycle to school, such as in the Netherlands, it is likely students will be at a stage of maintenance whereas where few students cycle, such as in Christchurch, students are likely to be at a stage of precontemplation.

4.2.3 The Prototype/willingness model

The PWM is a dual process model and was developed in relation to risky teenage behaviours such as smoking and alcohol use (Gibbons, Gerrard, Blanton, & Russell, 1998). It has also been used to predict health-promoting behaviours such as exercise and breakfast eating (Rivis, Sheeran, & Armitage, 2006). In contrast to the TPB, the PWM recognises the effects

of previous behaviour on attitudes, subjective norms and risk images (see Figure 13). Gerrard et al. (2002) explain the PWM is based on two primary assumptions about adolescent risk behaviour:

1. The importance of image (especially to adolescents). (The examples given by Gerrard et al. (2002) are that of typical drinkers and non-drinkers of alcohol.)
2. "...much adolescent risk behaviour is neither intended nor planned; instead, it is a reaction to circumstances that are risk conducive." (Gerrard et al., 2002, p. 602)

Risk image (prototypes) concern evaluations and perceptions people make about individuals who take part in risky activities. Risk image is assessed by considering two factors:

- a) prototype evaluation (the degree of liking one has for a risk image) and;
- b) prototype similarity (the similarity of the image to oneself).

The other main difference between the TPB and the PWM is that two decision-making pathways are recognised in the PWM: the reasoned path via behavioural intention (BI) and the intuitive path incorporating behavioural willingness (BW), and it is these two paths that result in the risk behaviour. The BI pathway is similar to the pathway of the TPB and is framed as "what do you plan to do?" The BW pathway however, is framed as "what are you willing to do?" (Gibbons et al., 1998, p1125). The PWM also recognises some decisions made via the behavioural willingness (intuitive) pathway can influence decisions made by the behavioural intention (reasoned) pathway i.e. intended behaviours may arise out of reaction to circumstances. Cycling to school may involve both pathways and interactions between them.

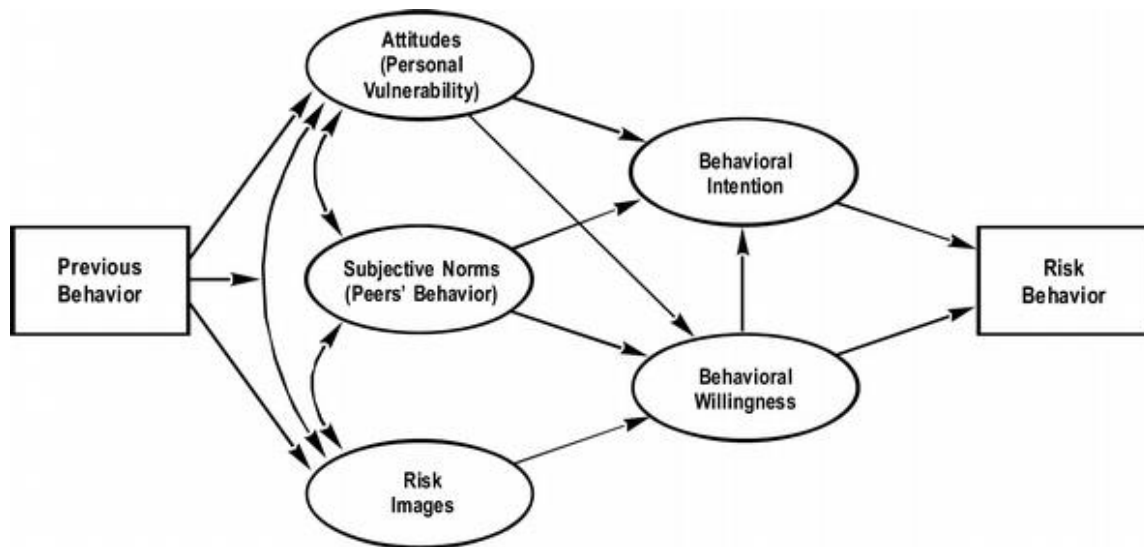


Figure 13: The Prototype Willingness Model (Gibbons, Gerrard, Lane, Suls, and Wallston (2003))

Gerrard et al. (2002) explain the social reactive (BW) pathway is particularly relevant with respect to adolescent risk behaviour, as it is based on two primary assumptions about adolescent risk behaviour; (i) the importance of image (especially to adolescents) and (ii) the notion that much adolescent risk behaviour is not intended or planned, but is instead a reaction to circumstances. Risk images are also relevant to cycling, as people who believe cycling is a dangerous activity may regard cycling as something they don't want to do, whereas those who believe cycling improves a person's health may be attracted to cycling. In addition, as with many activities, a social image is associated with cycling that may affect a person's willingness to cycle. As explained by Erikson (1982), image is often very important to adolescents and consequently they are very aware of the social implications of their behaviour. As a result adolescents in particular may make decisions about cycling via intuitive pathways related to behavioural willingness, in addition to deliberative pathways concerning behavioural intentions. The PWM may provide a useful framework, in addition to the TPB, for predicting cycling behaviour due to the possible relevance of risk images and intuitive decision-making. However, as the PWM was developed in relation to risky teenage behaviour such as smoking, drinking of alcohol and sex, the decision-making processes, and the influence of willingness, may be very different to the decision-making process associated with cycling to school, and these differences need to be borne in mind when assessing its usefulness.

The PWM may be applicable when considering teenage cycling behaviour as it was developed to explain adolescent, as opposed to adult behaviour: As discussed in section 3.2.5 adolescence is a time characterised by factors such as identity, self-esteem and peer relationships that are not as relevant to other phases of life. Several researchers have concluded behavioural models and theories are best at predicting behaviour where they are used for purposes similar to those to which they were developed (as discussed in section 4.1 above). Therefore, there are likely to be advantages in using a model designed specifically in relation to the age group it was designed for. However, the PWM was not formulated in relation to adolescent cycling behaviour and therefore its applicability to cycling should be treated with caution.

A further difference between the TPB and the PWM is that subjective norm is assessed differently in each (Forward, 2009; Ravis et al., 2006). In the TPB, researchers agree it is assessed as an injunctive norm (what people ought to do), whereas in the PWM, although it is still referred to as “subjective norm”, it is assessed as a descriptive norm (what people do, or ‘peer’s behaviour’ as shown in Figure 13) (Forward, 2009; Ravis et al., 2006). As a result, for activities where descriptive norm is particularly influential, analysis in terms of the TPB may not be adequate. Therefore, if for example having a friend to cycle with (or at least knowing other friends who cycled) greatly influenced a person’s intention to cycle, then analysis using variables of the TPB could yield misleading results. Consequently, for some activities, consideration of descriptive norms as contained in the PWM is useful.

The influence of descriptive norms will vary with respect to different travel behaviours. Eriksson and Forward (2011) note some support for the importance of descriptive norms in relation to travel by bus and cycle but not by car. In countries such as New Zealand, where the percentage of people travelling by bus and cycle is low, Eriksson and Forward’s finding may be consistent with conclusions by Manning (2009) that descriptive norms are particularly important for behaviours that are not socially approved of. Ravis and Sheeran (2003) also found for younger people, and health risk behaviours, a stronger link existed between descriptive norms and intentions. As this thesis concerns young people and some people consider cycling to be a health risk behaviour, Ravis and Sheeran’s finding also justifies the consideration of descriptive norms as contained in the PWM in this thesis.

4.2.4 Combined use of the Theory of Planned Behaviour and the Prototype/willingness model

Previous research has compared the predictive values of the TPB and the PWM in relation to teenage behaviours (Rivis et al., 2006; Spijkerman, van den Eijnden, Vitale, & Engels, 2004). Spijkerman et al. (2004) examined the contribution of prototypes from the PWM and variables of the TPB with respect to the prediction of smoking and drinking by adolescents. They found social images or prototypes made a significant contribution to the intention of adolescents with respect to substance use, that is, smoking and drinking. Rivis et al. (2006) examined whether the TPB augmented the PWM in their study of adolescents in relation to health-protective and health-risk behaviour. They concluded that for adolescents, variables from the PWM, in particular prototype similarity, enhanced the predictive ability of the TPB with respect to both health-protective and health-risk behaviours. The contribution of behavioural willingness (BW) to behaviour was not assessed in either of these studies.

Variables of the PWM that are not contained in the TPB (i.e. BW, risk image and descriptive norm) may influence adolescents' intention to cycle to school, and may enhance the predictions of behaviour. The combined consideration of the PWM and TPB is therefore worthwhile. Additionally, the use of Social Identity Theory, the Theory of Interpersonal Behaviour and the Transtheoretical Model may help to explain the behaviour of teenagers in relation to cycling to school.

4.3 Summary

In summary, the use of the Theory of Planned Behaviour and the Prototype/willingness model (PWM) as the principal theories to explain cycling to school by teenagers is appropriate. This is because they have been widely used to explain and predict travel behaviour and the behaviour of adolescents, respectively. The use of the Theory of Interpersonal Behaviour (TIB) and the role of habit could be examined in further research. Social Identity Theory may assist to explain why teenagers in NZ do not cycle to school and the Transtheoretical Model (TTM) may be useful to compare students who cycle to school and those who do not.

Chapter 5: Methods

5.1 Introduction

The main objectives of this thesis are to determine:

1. The nature of cycling to school by teenagers in Christchurch.
2. The predictive validity of the TPB and the PWM with respect to students' decisions to cycle to school.
3. Which variables of the TPB and PWM have the greatest influence over teenagers' decisions regarding cycling to school?
4. The influence of intrapersonal factors and behaviour settings (as contained in the ecological model of active transport) on cycling to school for teenagers.
5. Whether teenagers who have grown up in places where few teenagers cycle to school (such as the UK) are influenced by different factors when they move to places like the Netherlands where almost everyone cycles to school.

The study included research in high schools in Christchurch (New Zealand) and Voorschoten (The Hague Region of the Netherlands). The three research techniques used in this thesis were: a survey of students (section 5.3.2), focus groups with students (section 5.3.3), and interviews with teachers (section 5.3.4). All three of these techniques were used in Christchurch, whereas due to time constraints and administrative and practical difficulties of working with students in a distant foreign country, only focus groups were carried out in Voorschoten.

The surveys enabled analysis of the drivers of choices for cycling to school as they were used to determine which variables of the Theory of Planned Behaviour (TPB) and Prototype/willingness model (PWM) had the greatest influence over intention to cycle to school by adolescents. They also enabled analysis of the contribution of variables from the PWM, after variables of the TPB had been taken into account. The focus groups and interviews enabled the drivers of choices for cycling to high school to be examined in more detail and build on the analysis completed using the survey. As concluded by Clifton (2001) focus groups bring survey results to life and provide the stories and examples to help

understand what the numbers mean. Focus groups were conducted after the surveys to illicit further information.

This chapter reviews the three research techniques. It outlines how the research techniques were used, noting their advantages and limitations in relation to the wider social research methodological literature.

5.2 Ethics and permission

It is important for any research that involves human participants to be undertaken in a way that has appropriate regard for ethical standards and cultural values in relation to that research (Resnik, 2011). The University of Canterbury requires all research to have “the informed consent of participants, guarantee confidentiality of data and individuals, avoid unnecessary deception, minimise risk to all participants and be consistent with the Treaty of Waitangi obligations” (University of Canterbury, 2014, p. np). Consequently, Human Ethics approval was sought and obtained for all aspects of this research. The research was considered to be normal, rather than low-risk, as it involved people under the age of 18 years-old still attending school. Copies of approvals from the Human Ethics Committee; the letter sent to Christchurch schools; information sheets; consent and assent forms; interview questions for teachers; and the survey are included in appendices A-L.

As a result of some participatory methods, the perception exists that power is possessed by some groups (e.g. adults) and not by others (e.g. children) (Gallagher, 2013). This could occur with surveys, focus groups and interviews where the perception may be that power is possessed by the researchers. Such power imbalances can be redressed by children in various ways including writing bogus answers to survey questions, not contributing fully to focus groups and through giving politically correct answers. This was evident in this research where two students gave “helicopter” as an answer to how they got to school, and where some participants contributed little to focus groups. Staff were also likely to have given politically correct answers in interviews, however this was very difficult to determine.

5.3 Christchurch research

The city of Christchurch was chosen as one of the locations for this part of the study due to its proximity to my home and also because, like many other cities in New Zealand, it has experienced a decline in cycling rates since 1991. Christchurch is located in the Canterbury region and is a relatively small city of approximately 366,100 residents, with predominantly flat topography and a temperate climate. It is described by its city council as “the city of cycling, with, more people biking here than in any other city in New Zealand” (Christchurch City Council, 2014, p. np). Results of the New Zealand Census 2013 show the percentage of people over the age of 15 who travel to work by bicycle nationally was approximately 3% (Statistics New Zealand, 2014a) and for Canterbury this was approximately 5%. New Zealand has a population of 4.471 million, a land area of 271,000 square kilometres and a population density of 15 people per square kilometre (Statistics New Zealand, 2014b).

5.3.1 Guidelines and permissions

Prior to visiting Christchurch schools, a letter written to each school included the researcher’s association with the University of Canterbury, how the information would be used, the voluntary nature of participation, and the possibility to withdraw at any time. It also stated results could be published, where the data would be stored, and the research was subject to approval from the University of Canterbury Human Ethics Committee. It outlined that the data would be treated confidentially and the identity of individual students would not be made public. In addition, it stated parents would be able to view the survey online and advise their children individually regarding participation. A copy of the draft survey was attached to each letter (see Appendix B). Prior to visiting schools, written consent was obtained from the Board of Trustees of each school to undertake surveys and focus groups with students, and hold interviews with staff (see Appendix H). Parental consent was not required as schools acted in *loco parentis*. Information sheets were sent to teachers with copies for parents; consent forms were completed by teachers; information sheets were given to students; assent forms were completed by students involved in focus groups; and interview questions were sent in advance for teachers. See appendices.

5.3.2 School survey

Schools are both a convenient and effective place to study and change children's travel as they are a significant focus of communities and can be good distributors of information to families and the wider community. Schools also have an interest in improving children's health and road safety; and there is the potential for the overlap of these issues with the school curriculum (Alexander Ballard and Associates, 2005).

A survey of students was an appropriate method to use to meet the objectives of this research, as it enabled subsequent statistical analysis to be undertaken. This analysis assessed the relative contribution of the variables of the theory of planned behaviour (TPB) and prototype/willingness model (PWM) in relation to cycling to school by adolescents. It also enabled the analysis of the contribution of variables from the PWM after variables of the TPB had been taken into account and the contribution of year, gender, and decile¹² to be assessed.

The questions in section 2 of the survey were derived from existing literature examining behaviour. This literature included research by Armitage (2005) on physical activity, Gerrard et al. (2002) on adolescent alcohol consumption, Ravis et al. (2006) on adolescents' health-protective and health-risk intentions, Conner and Sparks (2005) on perceived behavioural control and Emond and Handy (2012) on bicycling to high school. Most of this literature related to adolescent behaviour and most examined behaviour in terms of the TPB or the PWM, or in some cases both. As a consequence, the questions in section 2 were largely predetermined.

Respondents and procedure

In early 2012, a pilot survey was undertaken at a Christchurch primary school using 25 year 5-8 pupils (8-13 years-old) to test student's comprehension of the survey. As the questions asked in section 2 of the survey were largely predetermined, the purpose of the pilot survey was largely to check for readability. Although these students were younger than the pupils to

¹² Every school in New Zealand is given a decile rating by the Ministry of Education. "School decile indicates the extent to which the school draws its students from low socio-economic communities...Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities. Decile 10 schools are the 10% of schools with the lowest proportion of these students." (Ministry of Education, 2015, p. np)

be surveyed, due to the range of reading ages of student, the comprehension of the groups was considered to be sufficiently similar. As a result of the pilot testing a few changes were made to the wording of the survey. In hindsight, it is recognised that it may have been preferable for the pilot survey to be undertaken with the study population and for reliability testing to be carried out on responses following the completion of the pilot survey. The pilot testing undertaken, however, was also recognised as having benefit.

To reduce workload and disturbance for schools, the survey was designed in conjunction with a fellow PhD student with similar interests. Questions 9, 12, 13, 14 and 15 of the survey (see Appendix N) were asked solely by this student and therefore are not analysed in this thesis. Questions 10, 11 and 16 were also included by my fellow student, but answers to these questions have been analysed in this research.

In 2012 twenty-eight state secondary schools in Christchurch City were invited to participate in a survey regarding the travel of year 9, 11 and 13 students (13-14, 15-16 and 17-18 years-old respectively). These year groups were chosen as data collected in research on child travel in Auckland, New Zealand showed changes in child travel at ages 10, 13 and 16 (Walton, 2011). Similarly, in the UK it was found children's preference for cycling peaked at age 10 and quickly fell to a point where by 13 years of age, cycling was the least preferred option (Osborne, 2001). The age of 16 years-old has also been identified as significant in countries where children are legally able to drive at this age (Orsini, 2005). Therefore, children in years 9-13 (12-18 years-old) were chosen for this study.

Seven of the twenty-eight schools agreed to distribute the surveys to their students. Similar to other transport studies, private and integrated schools were not asked to participate (Carver et al., 2013; Mitra & Buliung, 2015). This was because children (and their parents) self-select these schools and therefore often travel further to them (De Bruijn et al., 2005; Wilson et al., 2010) and distance has been shown to be a major factor affecting whether children cycle to school (Centers for Disease Control and Prevention, 2005; Thornton et al., 2010).

Schools were given the opportunity to have students complete the survey online or in paper form. Three schools chose to give students the surveys online and four chose the paper form. Students completed the paper survey during school time. Electronic surveys were completed both during school time and at home. A total of 792 students completed the survey (see section 6.2 for details of participation). Information about how the surveys were distributed

by teachers was not provided. Information provided by students however showed (with the exception of CGHS) they were all in social science, English or statistics classes. A further limitation of the study was that at CGHS, the electronic survey was only advertised on the school web page and carried out voluntarily by students in their own time. Consequently, these students self-selected. This may have biased results as students who cycled to school may have been more likely to answer the survey. The small sample size of this group (26) would however have reduced any possible adverse effects of this sample.

Students were told the aim of the project was to obtain information on how secondary school students travel to school, and attitudes to cycling. In accordance with ethics approval granted by the University of Canterbury, participation was voluntary, the survey was anonymous and participants could withdraw from the survey up until the time the survey was collected and added to the other surveys. I undertook all data input myself.

The results of self-reported behaviour can differ from the results of observed behaviour. This can be due to inaccuracy of recall, as concluded by Baxter, Thompson, Davis and Johnson (1997) in relation to reporting of school lunch choices, or due to response bias where socially acceptable answers are given (Furnham, 1986). In this research, information regarding behaviour was provided by participants via self-report, rather than observation. As a result, inaccurate answers may have been given in relation to all questions and self-report is recognised as a limitation of this research.

Measures

The survey was divided into two sections. Section 1 contained general questions, including gender, year, vehicle licences held, how a student usually got to school, where they travelled from, whether students had ever biked to school and the reasons why they did not usually bike to school. Section 2 assessed the TPB and PWM constructs including attitude, subjective norm, perceived behavioural control, intention, descriptive norm, willingness, prototype evaluation and prototype similarity. For all multi-item scales, items were summed and then averaged. If participants failed to answer more than 66% of items within a given subscale, their score was treated as missing. Means and standard deviations of the key variables, as well as correlations between these variables are presented in sections 6.4, 6.5 and 6.6. The details and basis for these questions are outlined below. Consistent with Gliem and Gliem

(2003), as Likert scales were used for most questions in section 2, Cronbach's alpha was calculated for each variable. Cronbach's alpha measures the internal reliability of a group of items, i.e. how closely related a set of items are as a group.

A recognised limitation of the research was that it was cross-sectional, whereas the TPB is most effective in predicting behaviour change over time. As a result, it is not possible to make conclusions about causality. However, predicting the cycling behaviour of teenagers was not an aim of the research, and therefore this limitation did not have a major effect.

Details of questions asked in section 2 in relation to variables of the TPB and the PWM, and the internal reliability of each group of items are subsequently discussed.

TPB variables

Attitude, subjective norm, perceived behavioural control and intention were all assessed with standard items (Armitage, 2005, Conner & Sparks, 2005b; see also Ajzen, 1991).

Attitude toward cycling to school was measured with six bipolar items on a 7-point scale (-3 to +3): "For me, regularly riding to school by bicycle would be... dull (not interesting)-interesting, unpleasant (not nice)-pleasant (nice), boring-stimulating, unhealthy-healthy, bad-good, and useless-useful" (Armitage, 2005). Cronbach's alpha indicated the attitude scale possessed good internal reliability in the current study ($\alpha = .93$).

Subjective norm (injunctive) was measured with six items (based on Armitage, 2005). A distinction was made between norms in relation to friends (three items) and norms in relation to parents (three items) as the influence of these two groups may differ. The items were: "My parents/caregivers think I should ride a bicycle to school" (1 = disagree, 7 = agree), "My parents/caregivers would of me riding a bicycle to school" (1 = disapprove, 7 = approve), and "My parents/caregivers think I ride a bicycle to school: (1 = should, 7 = should not). The last 2 items were reverse scored. The same items were used for friends. Items one and three were very similar, but differed as the scales were reversed. Cronbach's alpha in the current study was .80 for both subjective norm scales, indicating good reliability for the three items.

Perceived behavioural control was measured with five items on a 7-point scale (1 to 7) based on Armitage (2005) and Conner and Sparks (2005). The items were: “How much personal control do you yourself have over whether or not you ride a bicycle to school?”, “I feel in control of whether I ride a bicycle to school” (1= no control, 7= complete control), “To what extent do you see yourself as being capable of riding a bicycle to school?” (1= incapable (not able to), 7= capable (able to), “How confident are you that you could ride a bicycle to school?” (1= not very confident, 7=very confident) and “I believe I have the ability to ride a bicycle to school” (1= definitely do not, 7=definitely do). Cronbach’s alpha was .84 for the five items in the current study.

Behavioural intention was assessed using two items on a 7-point scale (-3 to +3) (based on (Armitage, 2005)Armitage, (Armitage, 2005)): “How often do you intend to ride a bicycle to school?” (-3= never, +3= frequently), and “I want to regularly ride a bicycle to school” (-3= definitely don’t, +3= definitely do). Cronbach’s alpha was .87 for the two items in the current study.

PWM variables

Descriptive norm was assessed using two items – one in relation to friends based on the number of friends that cycle and the other in relation to parents on a 7-point scale (1 to 7) (based on Rivis et al., 2006; Emond et al., 2012): “Think of the five people you know best of your age. Of these five people, how many always or sometimes cycle to school?” (0,1,2,3,4,5): “One or both of my parents/guardians bicycle frequently” (1= disagree, 7=agree).

Past behaviour was measured on a 5-point scale by the following “Think about the last two weeks. How many times did you cycle to school?” (never, almost never, sometimes, almost every day, every day).

Behavioural willingness was measured with six items based on work by Gerrard et al. (2002). Respondents were asked to respond to two scenarios:

“1) A friend invites you to a party on a Saturday afternoon. The party starts at 1pm and finishes at 4pm. Your friend lives 3 km from your house. There are no hills between your house and your friend’s house. You have a bicycle and are fit and healthy.”

“2) It is summer and it is light till 9pm. A friend invites you over to their house for a few hours in the afternoon. Your friend lives 3 km from your house. There are no hills between your house and your friend’s house. You have a bicycle and are fit and healthy.

The two scenarios were very similar, with the only difference being the type of event being attended. For both scenarios, participants were asked to answer three questions in response to the following situation: “Someone in your house offers you a ride in their car”. (a) “How willing would you be to take the ride?” (b) “How willing would you be to tell them “no thanks?” and (c) “How willing would you be to ride a bicycle to your friend’s house?” (1= very willing, 7= not very willing). Items, (b) and (c) were reverse scored and Cronbach’s alpha for the six items in the current study was .83.

Prototype evaluation (imagined) was measured on a 7-point scale by asking respondents the following question: “Imagine you see someone from your year group cycling to school. Complete the following sentence: In general, I think this person is: ...” The first nine items were the same as those asked by Gerrard et al., (2002): smart, popular, immature (childlike), cool, self-confident, independent (makes their own decisions), unattractive (unappealing), dull (not interesting), considerate (thinks of others) (1= not at all, 7= extremely). Five items relevant to cycling behaviour were added in the current study: fit, lazy, doesn’t care what people think of them, doesn’t care about their safety, cares about the environment (1= not at all, 7= extremely). The negatively formulated items were reverse scored: immature (childlike), unattractive (unappealing), dull (not interesting), lazy, doesn’t care about their safety.

The 14 prototype evaluation items were subjected to a factor analysis with varimax rotation. Although four components with eigenvalues greater than 1 were found, the screeplot showed a clear break after the second component. The two component solution explained 44% of the variance. All the positively worded items (i.e. smart, popular, cool, self-confident, independent (makes their own decisions), considerate (thinks of others), fit, doesn’t care what people think of them, cares about the environment) loaded onto the first factor, whereas all the negatively worded items (i.e. immature (childlike), unattractive (unappealing), dull (not interesting), lazy, doesn’t care about their safety) loaded onto the second factor. Cronbach’s

alpha for these two components in the current study were – ‘positive prototypes’ ($\alpha=.83$) and ‘negative prototypes’ ($\alpha=.68$).

Prototype evaluation (impression) was also measured with an item derived from Ravis et al. (2006): “How favourable (positive) is your impression of the type of person your age who cycles to school?” Respondents were asked to draw a vertical line on a grid from 0 (extremely unfavourable) to 100 (extremely favourable).

Prototype similarity was also derived from Ravis et al. (2006) and was measured on a 7-point scale (1-7) by the following: “How similar are you to the type of person your age who cycles to school?” (1= very similar, 7= not very similar). This item was reverse scored.

Data Analysis

Data analysis was carried out on the survey data. Pearson’s r was calculated to investigate the linear correlation between each of the variables. It gives a value of between +1 and -1, where 1 is a fully positive correlation, 0 indicates no correlation, and -1 indicates a fully negative correlation. Pearson’s chi-square tests were also carried out to test the significance of gender, year and decile in relation to whether or not students biked to school. Following the calculation of the correlations, a hierarchical regression analysis was carried out to test whether additional variables of the PWM enhanced predictions of teenagers’ intentions after variables of the TPB were taken into account. In hierarchical modelling, regression takes place in steps. In this study, hierarchical regression took place in three steps. This was done in order to determine the influence of each of these three groups of factors, when regression was undertaken in this order. In the first step of the hierarchical regression analysis, gender, year and decile (socio-economic status) were entered as control variables. In the second step, the TPB variables were added, followed by the PWM variables in the third step. The variables were added in this way as an aim of the thesis was to determine the relative predictive validity of the TPB and the PWM with respect to student’s decisions to cycle to school. The dependent variable (intention) was treated as a continuous variable. The statistical package, *IBM SPSS Statistics 22.0.*, was used to undertake this modelling. As a result of the hierarchical regression analysis, beta values were calculated for each variable and significant beta values were identified. The change in R^2 (the contribution to the explanation of the variance in the dependent variable) was calculated for each step. This

provided information about the percentage of the variance in intention to cycle to school explained by each group of variables, i.e. the increase when the predictor variables are added to the analysis rather than the overall R^2 for the model.

5.3.3 Focus Groups

Focus groups provide an opportunity to hear the views of study participants in their own words and to observe interaction between participants as they express these views. Focus groups were used to examine some of the survey questions in greater depth and to ask a few additional questions. The aim was to gain a greater appreciation of the views of adolescents in relation to their transport choices. Focus groups were also used to help analyse the results of the surveys, in addition to the implications. In this way it was hoped that focus groups would “bring the survey results to life” and provide “the stories and examples that help us understand what the numbers mean” (Clifton & Handy, 2001, p. 3). Although focus groups can sometimes be used to understand debates around and between personal attitudes and positions (Conradson, 2005), this was not always easy with younger teenagers. Further challenges with focus groups involving children and adolescents are as follows:

- 1) Students (in particular those at the younger end of the 13-18 year-old range) are used to an adult guiding their discussion at school. As such they may not feel comfortable initiating or continuing a conversation about the topic with their peers (Hay, 2010; Krueger & Casey, 2009).
- 2) Participants may find it difficult to remain attentive for the duration of a focus group (Krueger & Casey, 2009).
- 3) Students, and particularly younger children aged 13 years, may not have sufficient confidence to discuss their views with others.
- 4) Focus group participants may give answers they think the facilitator wants to hear, and this may be accentuated if participants fear peer group disapproval Smithson (2008). As students may have wanted to please me as a facilitator and as adolescence is a time when identity, self-esteem and peer relationships are very important (Erikson, 1980), both these issues were relevant for my focus groups.

Focus groups were held with 12 groups of students in Christchurch. These focus groups examined bike ownership, barriers to cycling, norms, stereotypes (prototype evaluation), attitudes to vehicle licences, non-car ownership and the status inferred by car ownership (see Table 1).

Selection of schools for focus groups

All seven schools who participated in the surveys were asked to participate in focus groups. As one of the objectives of the research was to consider differences between schools of different deciles, it was decided to conduct focus groups at schools of low, middle and high deciles. The schools where focus groups were held were those who responded first to requests for groups, which fortunately resulted in focus groups from a range of deciles. As another objective of the research was to consider differences between boys and girls, it was necessary to hold focus groups at both CBHS and CGHS (two high decile schools).

Guidelines and permissions

Those teachers that agreed to organise focus groups were sent an information sheet similar to that provided to members of Boards of Trustees. An information sheet was also distributed and discussed with students at the beginning of each focus group (Appendix N). Students were also asked to sign an assent form to take part (Appendix J). By signing this form, students agreed they had read and understood the project as outlined in the information sheet; they understood they could withdraw any information they provided; and that the project had been reviewed and approved by the University of Canterbury Human Ethics Committee.

After completing the assent form, a few guidelines for conversation were explained to each group:

- Respect the views of others.
- What is said within the focus group is confidential should not be repeated outside the group.
- Individuals are encouraged to discuss the questions with others in the group rather than directly with the facilitator/researcher.

Venues and recording

All focus groups in Christchurch were held in rooms on school premises. As noted by Smithson (2008), setting is important as children need to feel comfortable for focus groups to be effective. Focus groups were audio-recorded, to allow transcription of the dialogue. They were not video-recorded, primarily for ethical reasons as in the case of children, parents may be concerned about the use of their child's image and voice as part of a publication (Banks, 2001). Furthermore, it would have been difficult without a research assistant to video and ask questions at the same time.

Size of groups

Focus groups needed to be large enough to provide opportunities for sufficient interaction between participants but small enough so all individuals participated. Hay (2010) recommends focus groups of six to 10 people, with fewer than four being too small and greater than 10 too large.

All liaison teachers were asked to provide six students for each focus group. However, the resulting focus groups ranged from four to six. This occurred as in such situations it wasn't possible to interrupt the teacher and ask for more students.

Group composition

To ensure participants have enough in common to increase the likelihood of a productive discussion occurring, it is useful if groups are as homogeneous as possible (Bosco & Herman, 2009; Conradson, 2005). Homogeneity also enables comparison between groups. Smithson (2008) recommends single sex groups and groups with similar characteristics. Krueger and Casey (2009) also suggest separate groups for girls and boys between the ages of 12 and 14, as they suggest focus groups can be chaotic, even on mundane topics. Consequently, I sorted participants in my focus groups by year group, sex and school decile. It is sometimes suggested that it is better not to have people who know each other in a group as people will

not want to express views that are dissimilar from their peers (Hay, 2010). Although this may be particularly relevant for teenagers due to the importance of peer pressure (Bukatko, 2008), it is not possible to avoid this situation in a school context where most children are known to each other. Consequently, this factor may have limited the degree of discussion between participants. Hay (2010) notes however, that regardless of whether people know each other, there is a tendency for individuals within groups to have a preference for agreement. Therefore, the outcomes of focus groups will also be affected as a result of this aspect of human nature.

Details of the composition of the focus groups are shown in Table 4. Anomalies exist between the size and composition of focus groups due to logistical issues. These included teachers being unable to find sufficient year 13 boys to participate at the time required and in two cases year 10 students being more available at the required time than year 9 students. As year 9 and year 10 students are similar in age and neither have the option of driving to school, their views are considered sufficiently similar and therefore this anomaly is not considered to jeopardise the validity of results.

Although surveys had been completed with year 9, 11 and 13 students, it was decided it was not necessary to hold focus groups with year 11 students. The primary reason for this was that one of the main aims of the research was to compare the differences between driving and non-driving teens. It was concluded very few (if any year 11 students) would be driving to school. Consequently their views on travel would be most similar to that of year 9s, and year 11 focus groups would not add sufficient new material to warrant their inclusion.

Individual participation

Consistent with Valentine (2005), it was originally intended that students would be identified through the survey to participate in focus groups. However, for logistical reasons this did not occur as it would have been very difficult for schools to contact and assemble students who had indicated in the survey they were prepared to participate in focus groups. Instead focus groups were held with students sent by teachers. Teachers were asked to preferably send students who lived close enough to cycle to school but didn't cycle. This suggestion was made as it was thought these students would provide the most insight into why teenagers

don't cycle to school. It was not always easy for teachers to provide students with these characteristics, however most students fell within this category. In hindsight, to enable direct comparison with the survey results, the ideal situation would also have been for students in focus groups to live between 1 and 4km from school. However, this would have been very difficult for teachers to achieve as it would have been hard for them to accurately identify such students, and supply participants of the correct age group and gender at the required times.

Number of questions or activities and time taken

To ensure students stayed on task, it was important for the duration of focus groups and the number of questions to be limited. Smithson (2008) suggests focus groups should be between one and two hours. For young people, Krueger and Casey (2009) recommend limiting groups to 60 minutes or less and just 6-8 questions, rather than 10-12 questions for adults.

To minimise disruption for students and teachers, all but one focus group was held during school hours, with the length of focus groups restricted to one class period. As a consequence, the length of focus groups conducted during school hours ranged from 50 minutes to one hour. Due to this time limit, not all focus groups completed all the possible 17 activities and in hindsight, perhaps fewer questions could have been asked. Question 17 regarding the reasons for cycling was only asked of year 9 students at CBHS, as this question was devised primarily for students in Voorschoten (who cycled to school), focus groups at CBHS were held after the visit to Voorschoten, and there was insufficient time to ask year 13 CBHS students this question. This example highlights another characteristic of the focus groups; that there was far more discussion in some groups than others, and fewer activities were completed where there was lots of discussion. However, the questions were mostly a means to generate discussion therefore the number of questions asked was not the prime consideration. The year 13 focus group at CGHS was held outside school hours due to time pressures experienced by the girls at the time. As a consequence, the focus group was longer and it was possible to complete all the activities. Food was provided for some focus groups – because as stated by Krueger and Casey (2009, p. 177) “food is magic” (i.e. it is a great draw for hungry teenagers). At the suggestion of the teacher, food was provided as an inducement to take part in the focus groups at Aranui High School. Food was also provided at HHS and

to CGHS students that met after school in recognition of them giving up their own time and as it was at the end of their school day.

As recognised by Krueger and Casey (2009), due to differences in attention spans, and other characteristics, different techniques need to be employed for focus groups of young compared to old people. As a consequence, it was necessary for me to devise a combination of techniques that would yield the best results for teenage focus groups. To increase the likelihood that students would remain attentive throughout focus groups and participate fully, I took a systematic approach to the groups with a set structure to guide discussion. I also varied the types of activities during the focus group sessions and used a variety of “enabling techniques...to remove inhibitions, encourage discussion, and generate ideas and creative thinking” (Mayes, Halliday, & Hatch, 1996, p. 8) for the same reasons. I started each group with an exercise using toy cars and other vehicles to break the ice with groups and begin with something fun, visual and tactile. I also used image response, picture sorting, sentence completion, benefits laddering, word association and speech bubbles.

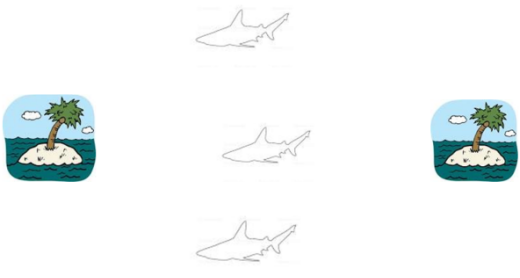
Several techniques were employed with focus groups to encourage independent thought and participation. For some questions I asked students to write down their answers to questions prior to discussing them. I did this to increase the likelihood students would first think for themselves, rather than just repeating what others in the group had already said, either to avoid thinking for themselves or due to the need for peer group approval (whether consciously or unconsciously). Although the aim was for participants to discuss the subject between themselves (Krueger & Casey, 2009), due to the general reluctance of some students to speak, in most cases I asked each student in turn for their response. As a function of focus groups is to generate debate (Conradson, 2005), I welcomed interjections and comments. I varied the direction of questioning of the group so that the same person wasn't always the first or last to be asked. Generally at the beginning of any session, students were more reticent and less talkative, but grew progressively more relaxed and talkative towards the end of the session. My liking for interacting with teenagers hopefully also helped develop a rapport with the groups. This is important for working with children (Krueger & Casey, 2009). However, despite this, some groups were more forthcoming than others, particularly older students and girls.

Individual questions asked

Table 1 lists the questions asked in the focus groups, along with the related justification.

Table 1: Questions asked in focus groups and their justification

Questions	Justification
Q1: How did you get to school today? How long did it take? Is that usual?	This question and question 2 were asked in order to glean some background knowledge about individual students so their answers to subsequent questions could be put into perspective.
Q2. Bike ownership?	<p>Where there was room, students were asked to stand up and move into different groups for this question in order to give them some variety and get them moving.</p> <p>1: Who has ever owned a bike? (Ask those who have (Group A) to move to one side of the room. Those who haven't (Group B) were asked why not and did they ever want one?</p> <p>2: Of those who have ever owned a bike (Group A)? Who still has a bike now? Those who don't to move to group B.</p> <p>3. Ask Group B – Is there anyone in this group who doesn't think they have the necessary knowledge or ability to ride a bike to school? (No shifting required.)</p> <p>4. Ask Group A – Have you have ridden your bike anywhere in the last year? Those who haven't go to group B.</p> <p>5. Ask Group A – Who still rides to school? (No shifting required.)</p>

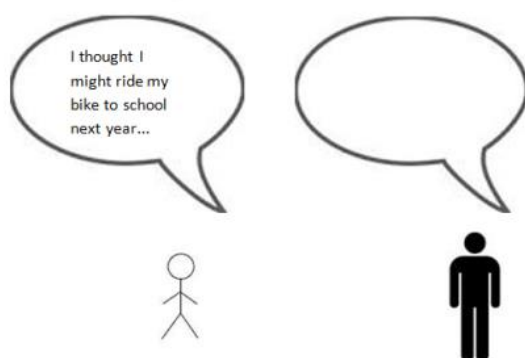
	<p>6. Ask Group B – Is there anyone in this group whose parent/caregiver won't let them bike to school (No shifting required.)</p>
<p>Q3: Sharks and islands. Reasons why you think it is too hard to bike to school i.e. barriers.</p> 	<p>As one of the main objectives of the research was to determine the reasons why so few teenagers cycle to school, this question was asked fairly early on in each focus group. However, rather than just ask students why they didn't cycle to school; they were given a printed page with two islands on either side, and three sharks swimming between the islands. They were then asked to think of one island being home, the other island being school and the sharks being the things that would make it hard for them to cycle to school. (For those students who did cycle to school, they were asked to think of reasons why they didn't always cycle to school.) Each focus group was given a few minutes to write down their answers before they were asked to discuss what they had written.</p>
<p>Q4: How to overcome barriers</p>	<p>In this question students were asked to write down ways to overcome the barriers, they wrote down in question 3. This was to generate further discussion about the barriers.</p>
<p>Q5: Do any of your parents bike? How do most of your parents get around?</p>	<p>This question was asked verbally to assess the importance of descriptive norm in relation to parents.</p>
<p>Q6: Do any of your friends bike? How do most of your friends get around?</p>	<p>This question was asked verbally to assess the importance of descriptive norm in relation to friends.</p>

Q7: For me regularly cycling to school would be...

In this question students were asked to complete the sentence. They were then asked to write down their answers and to discuss this with me. This type of completion technique was described by Ritchie and Lewis (2003).

Q8: Speech bubbles

Parent/Caregiver - Male



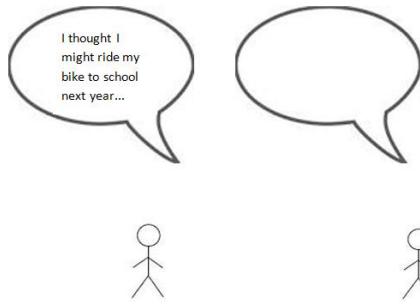
Three questions were asked to enable an assessment to be made of the importance of subjective norm (injunctive). Like question 7, these questions were based on the completion technique as described by Ritchie and Lewis (2003). The questions were put in the form of speech bubbles to make it more fun for participants. Speech bubbles also had the effect of limiting the amount they wrote. They were separated into three different questions to enable comparisons to be made between the influences of mothers/female caregivers, fathers/male caregivers, and friends. This question enabled an assessment to be made of the importance of subjective norm (injunctive) with respect to male parents or caregivers.

Q9: Speech bubbles

Parent/Caregiver - Female



This question enabled an assessment to be made of the importance of subjective norm (injunctive) with respect to female parents or caregivers.

Q10: Speech bubbles**Friend**

This question enabled an assessment to be made of the importance of subjective norm (injunctive) with respect to friends.

Q11: Prototype evaluation

I gave each group 24 pictures of different people. I then asked them to decide how each person would travel - car, bus, bike, walk, motorbike, and explain why they put them under the category they did.

The technique employed in this question was card or picture sorting. The purpose of this exercise was to assess prototype evaluation (the degree of liking one has for a risk image). Students were asked to talk about why they were placing each person in a particular category as they did this, and after all the pictures were in place they were also asked why they put particular pictures under the headings they did.

Q12: Describing images



Figure 1 – girls on bikes



Figure 2 – Girl in car



Figure 3 – boy on BMX bike



Figure 4: Boy in car

To further assess prototype evaluation, students were asked to describe the people shown in four pictures. For each question students had the choice of 15 words to circle. These words were the same as those used in Section 2, question 20 of the survey, i.e. smart, popular, immature, cool, self-confident, independent, unattractive, dull, considerate, fit, lazy, feminine/ladylike, doesn't care about their safety, cares about the environment, doesn't care what people think of them.

Students were given a few minutes to circle four words for each picture and then asked them to discuss their answers.

Q13a: Do any of you have a car licence? Are you thinking about getting one, why, why not?

OR

Q13b: Are you thinking about getting a car licence when you are old enough, why, why not?

Year 13 students were asked this question as it was possible due to their age, that they would have a licence.

Year 9 students were asked this question as due to their age, they would not have a licence.

Q14: Does owning a car give you status?

Both year 9 and 13 students were asked this question.

Q15a: How would not having a car change your lifestyle?

OR

Q15b: Can you imagine living without a car in your family?

Both year 9 and 13 students were asked one of these questions. Which question was asked was a random decision.

Q17: Reasons why you cycle. Students were given the following four choices and asked to say the main reason why they would cycle to school:

- I enjoy it
- It's habit, I don't really think about it
- It fits with how I see myself
- It's a healthy thing to do.

This question was designed primarily to ask students in Voorschoten why they cycled to school. In general it wasn't thought to be worth asking this question in Christchurch as so few students cycle. However, following work in Voorschoten, this question was asked of one group of 9 boys in Christchurch. Time constraints also limited asking this question with other groups.

Analysis of focus groups

I transcribed all focus groups myself and analysed focus groups using theory-lead qualitative analysis, as recognised by Hayes (2000). I grouped responses in categories lead by the Theory of Planned Behaviour, the Prototype/willingness model and the Ecological Model of Cycling for Transport to School, i.e. based on subjective norm, descriptive norm, attitudes, perceived behavioural control, and behavioural setting. Within each of these groups, I used sub-groups to further analyse focus groups. I used *NVivo* as a tool to assist with the analysis due to the large amount of data to be analysed.

5.3.4 Staff Interviews

Face-to-face interviews have been described as the “‘Rolls Royce’ of data collection” as they are costly and time intensive (Leeuw, 2008, p. 318). They also offer a lot of flexibility as they enable both verbal and non-verbal communication to occur and give the interviewer the opportunity to ask additional questions and explain or elaborate upon questions (e.g. should an interviewee be confused or unsure about something they are asked). Semi-structured interviews were used to interview teaching staff, in preference to structured interviews. This was because structured interviews have a limited range of answers, whereas semi-structured interviews enable interviewees to divert from the prescribed questions and enable the interviewer to ask probing questions (Hayes, 2000; Leeuw, 2008). Interviews were used to obtain background information about the transport environment at, and near, each school and to gain an understanding of how prominent transport issues were in relation to each school. Semi-structured interviews were used to ensure similar questions and topics were discussed at each school and consequently similar information was obtained with respect to each school.

Interviews were held with one teacher from each of the seven Christchurch schools that participated in the survey. Prior to the interviews, teachers were sent a copy of the intended interview questions (Appendix M). As suggested by Hay (2010), as a warm-up, those teachers that agreed to be interviewed were sent an information sheet with similar information to that provided to Boards of Trustees (Appendix C). Teachers interviewed were asked to complete a written consent form at the beginning of each interview (Appendix I).

In all cases, the teacher interviewed was the key contact at each school. Interviews were all held during school time, on school premises, at times suitable to the teachers. In accordance with Hay (2010), interviews were conducted in an empathetic manner where participants were treated as having valuable information and insight. As interviewees interviewed by the same person tend to have more similar answers (Fowler, 2009; Leeuw, 2008), I carried out all the interviews myself. During the interviews I made an effort not to express views or judgements on answers given which might affect subsequent answers. I was also however aware of the potential that in an interview situation interviewees may give answers they considered socially acceptable or conventional. However, is more likely to be an issue where questions are very sensitive (Leeuw, 2008) which was not the case for the questions asked. Each interview took approximately one hour and was aurally recorded to enable transcriptions to be made later. I took notes during interviews to provide an additional record to the audio recordings. Following the interviews, I transcribed all the interviews and sent a copy to staff for them to check for accuracy and to give them the opportunity to ask for any changes or deletions to be made. I subsequently analysed all transcripts using thematic analysis (Hayes, 2000).

The interviews contained a mixture of closed and open question (see Appendix M). Initial closed questions were asked first about student numbers, staff numbers, school zone boundaries, how students got to school, staff travel, cycle facilities provided by the school and school uniform. These questions involved fairly factual answers and enabled a rapport to be established with the staff member. This was in accordance with recommendations of Hay (2010) that interviewers should start with simple non-threatening questions, then progress to more abstract and reflective questions. Following the opening questions, teachers were then asked a series of open questions about why they thought few students cycled to school, whether there had ever been any transport issues related to the school, whether they thought the travel behaviour of students had changed over time and whether they thought there was any need to change the way students travelled to their school. I asked these open questions to allow interviewees to provide greater depth to their answers and discuss the topic more broadly. I also asked some supplementary closed questions towards the end of interviews regarding vehicle use and/or ownership by students, rules for bringing vehicles to school, the existence of cycling clubs at the school and whether transport choices were taught at the school (Appendix N).

5.4 Voorschoten

5.4.1 Location and characteristics

Voorschoten is a village and municipality in the South Holland province of the Netherlands, with a population of approximately 25,000 people. It is surrounded by the cities of Leiden, Wassenaar and The Hague and is located in the Randstad. The Randstad is the major industrial and commercial centre of the Netherlands and includes the provinces of South Holland, North Holland and Utrecht and the major cities of Amsterdam, Rotterdam, Utrecht and Den Haag. Voorschoten was chosen as the location for this part of study as it is the location of the British School in the Netherlands— an independent international school. Like most of the Netherlands, the topography of Voorschoten is flat. The Netherlands is a small country with a land area of approximately 41,500km². As a consequence, the climate does not vary much throughout the country and it experiences a temperate maritime climate with daytime temperatures of between 2-6°C in winter and 17-20°C in summer (WeatherOnline, 2014). In 2010, 25% of all trips in the Netherlands were taken by bicycle, 19% by foot and 4% by tram, bus, train and metro. The percentage of all trips undertaken by walking, cycling and public transit was approximately 50%. The country is densely populated with 16.5 million inhabitants and an average population density of approximately 500 people per square kilometre (Ministry of Transport Public Works and Water Management, 2010).

5.4.2 Focus Groups

As discussed in relation to focus groups held in Christchurch, focus groups provide an opportunity to hear the views of study participants in their own words and to observe interactions between participants as they express these views.

Focus groups were held in Voorschoten to enable comparisons to be made with the cycling-related attitudes, values and beliefs of students in Christchurch, New Zealand (see Chapter 6). All students spoken to in Voorschoten cycled to school, spoke fluent English and, with the exception of one student, had lived in countries other than the Netherlands. As a consequence, it was possible to compare students in Christchurch with students who had

often grown up in a country (and culture) other than the Netherlands, but subsequently lived in the Netherlands where the percentage of people cycling is the highest in the world (Bassett et al., 2008).

This is useful as it enables the comparison of adolescents who have grown up in places where few teenagers cycle to school (such as the UK) and moved to the Netherlands where almost everyone cycles, with those who have lived all their lives in NZ where few people cycle.

The students interviewed in Voorschoten had previously lived in a range of countries including Oman, Malaysia, Scotland, Singapore, USA, Russia and England. None had ever cycled to school in any country other than the Netherlands. Additionally, none of the countries the students had lived in contained cities ranked in the top 20 bicycle friendly cities of the world according to the Copenhagenize Index for 2013 (Copenhagenize EU Design Company, 2014) and cycling rates for countries such as the United Kingdom and the USA are around 1-2% (Bassett et al., 2008).

Guidelines and permissions

Prior to holding focus groups, parents of students asked to be part of the focus groups were sent an information sheet, a list of questions to be asked and consent form (Appendices G and L). Students were given an information sheet at the beginning of each focus group (Appendix E) regarding the research. Students also signed an assent form (Appendix K) and their parents were asked to sign a consent form (Appendix L).

After completing the assent form, the same guidelines for conversation (as explained to the Christchurch groups) were explained to each group:

- Respect the views of others
- What is said within the focus group is confidential and should not be repeated outside the group
- Individuals are encouraged to discuss the questions with others in the group rather than directly with me.

Venue and recording

Focus groups in Voorschoten were held at the home of two of the boys in the focus groups whose mother was my key contact. Focus groups were recorded aurally to allow transcription of the dialogue following the interviews. They were not recorded visually as this was not favoured for ethical reasons and as it would have been difficult to video and ask questions at the same time.

Participation, size of groups and group composition

In Voorschoten, the mother of the two boys who organised the groups, asked friends and classmates of the two boys to attend the focus groups. The plan was to have six students in each focus group. However, three students failed to show up. Consequently the year 9 and 13 groups included four and five students, respectively. To ensure participants were as homogeneous as possible, as recommended by Bosco (2009) and Conradson (2005), focus groups were divided by year group. Each group however included both girls and boys, due to the difficulties in organising groups to meet in a distant, foreign country. Food was provided for these focus groups, partly as a reward for their attendance in their own time.

Questions answered

The two focus groups were held in the weekend, outside school hours. As a result the focus groups were able to continue until all the questions were completed. The questions asked of students were the same as for students in Christchurch, with the exception that only one group in Christchurch was asked why they chose to cycle, whereas both groups in Voorschoten were asked this question. Students were asked to rank the following reasons for cycling in order:

- I enjoy it
- It's habit, I don't really think about it
- It fits with how I see myself
- It's the most practical choice for doing what I need to do

- It gives me freedom.
- It's a healthy thing to do.
- It's good for the environment.

The year 13 students were given all seven options to consider. As the year 9 group met after the year 13 group, this was cut back to the first five options for this group as it was thought five choices provided sufficient choices for group discussion.

Chapter 6: Cycling to High School in Christchurch, New Zealand

This chapter presents the results of information obtained in Christchurch regarding cycling to high school by teenagers. Sections 6.1 to 6.4 present the results of section 1 of the survey. Sections 6.5 and 6.6, present the results of the correlation calculations and the hierarchical regression, and section 6.7, presents further results of the surveys, in addition to the focus groups and staff interviews.

6.1 Characteristics of the subject schools

The map shown in Figure 14 shows the location of the study schools, school zone boundaries and 2013 Deprivation Index by Census Area Unit (CAU). Linwood College and Aranui High School were located within areas that were more deprived, Hillmorton and Riccarton high schools were located within areas of medium deprivation and Cashmere, Christchurch Boys' and Christchurch Girls' high schools were located in areas that were the least deprived. This deprivation is reflected in the decile rating for each school. All schools were located within the city of Christchurch. Four of the seven schools had school zones. All land within each school zone was flat with the exception of the Cashmere High School zone which included some hilly topography. Table 2 and 3 provide the results of interviews with teachers regarding the characteristics of each of these schools.

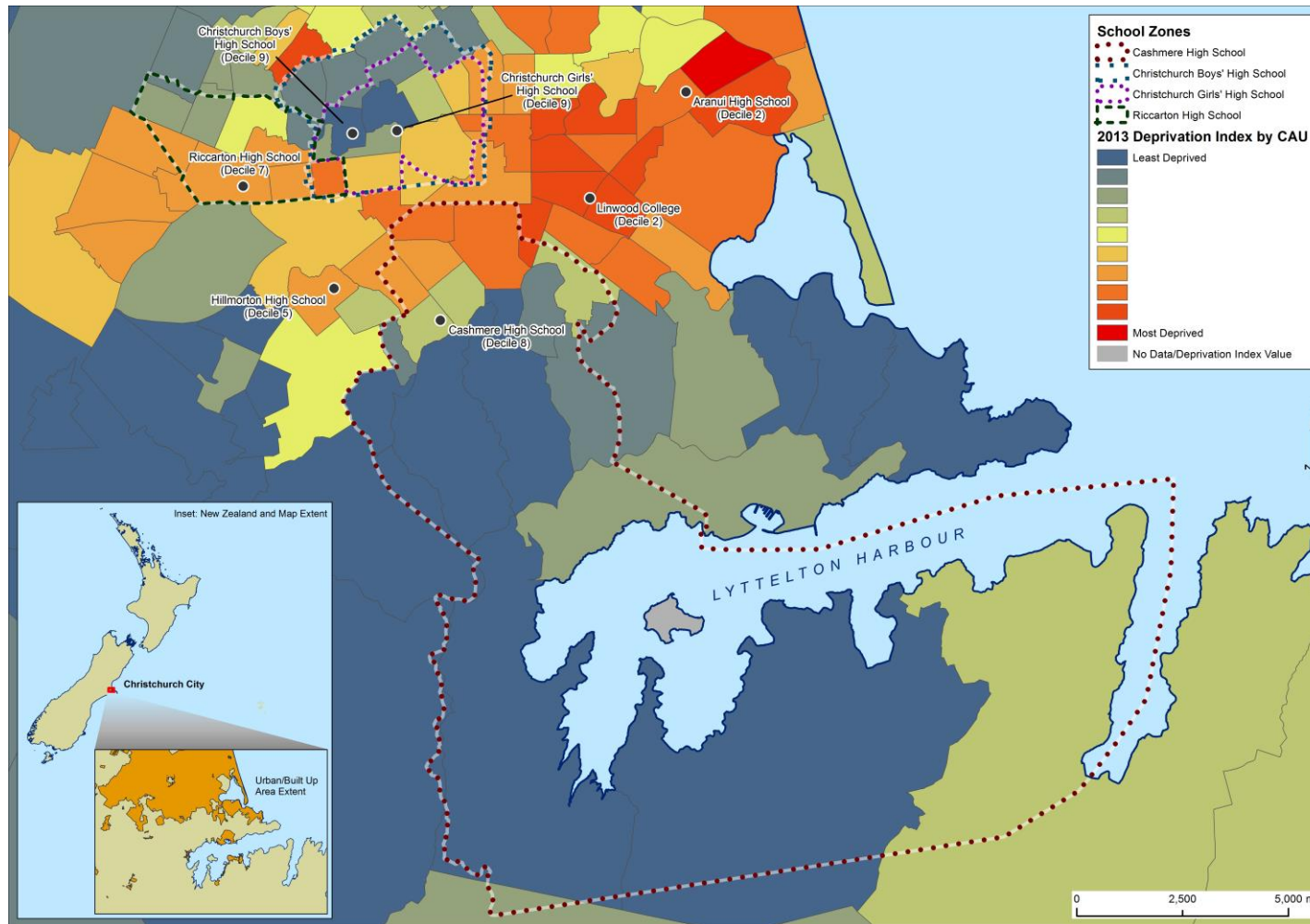


Figure 14: Location of study schools in Christchurch, school zone boundaries and 2013 Deprivation Index by Census Area Unit (CAU)
 (Note: No school zones exist for Linwood College, Hillmorton High School or Aranui High School).

Table 2: General school characteristics

School	Decile	Roll - as at June 2011	Staff no.	Coedu- cational or single sex (SS)	School zone in place	% of stud- ents living in zone	School bus	Type of road situated on	Traffic volume on closest road ¹³	Provision of infrastructure associated with cycling to school			
										Separated cycle paths accessing school	Cycle stands	Locked cycle storage	Lockers
Aranui High School	2	594	82	Coed	No	High	No	Local	287 vehicles	No	Yes	No	No
Cash- mere High School	8	1708	120	Coed	Yes	Unsure	Yes	3 entrances- 2 on local roads and 1 on arterial	9781 on road on arterial road	Yes along river	Yes	Yes	Yes

¹³ For a 12 hour period, averaged over 7 (Christchurch City Council, 2013)

Christ-church Boys' High School	9	1322	118	SS	Yes	80	Yes	Local road	Located very near road of 8892 and 16951 vehicles	Yes in nearby park of 165 ha and on local roads	Yes	Yes	Yes
Christ-church Girls' High School	9	1081	Un-kno wn	SS	Yes	60	Yes	Local Road	Located near road of 24073 vehicles	Yes in nearby park of 165 ha and on local roads	Yes	No	Limited numbers
Hill-morton High School	5	634	Un-kno wn	Coed	No	High	No	Local road	922 vehicles	No	Yes with security cameras	No	Yes
Lin-wood Coll- ege	2	869	Un-kno wn	Coed	No	High	Yes	Arterial	23172 vehicles	No	Yes, covered	No	
Riccart-on High School	7	1014	120	Coed	Yes	85	No	Arterial	13706 and 17900 vehicles	No	Yes with security cameras	No	Yes

Table 3: School Characteristics re uniform, cycle clubs and transport issues

School	Uniform requirements			Existence of bike club at school	Transport issues at or near the school
	Girls	Boys	Seniors in final school year		
Aranui High School	Option of wearing skirts, trousers or shorts at any time of the year	Shorts or long trousers	Casual dress (no uniform)	No	Transport issues not a major concern.
Cashmere High School	Skirts in summer and kilts with a length between the knee and ankle in winter	Shorts or long trousers	Casual dress (no uniform)	Yes, cycle club of 2-3 students	The school has requested a controlled pedestrian crossing near the school entrance but, at the time interviews were held, this had not happened.
Christchurch Boys' High School	N/a	Shorts or long trousers	shorts or long trousers	Yes, cycle club of 30-40 students	School concerned for safety of students on the two busy adjoining roads.
Hillmorton High School	Skirts in summer and very long (at times ankle-length) kilts in winter	Shorts or long trousers	Casual dress (no uniform)	No	No major traffic concerns due to location on a quiet suburban road.
Linwood College	Skirts, kilts or shorts	Shorts or long trousers	Casual dress (no uniform)	No	Concerns for safety of students on the main road adjoining the school.
Riccarton High School	Skirts	Shorts or long trousers	Casual dress (no uniform)	Yes	Controlled pedestrian crossing installed in past. Concerns for safety of students on the two main roads adjoining the school.
Christchurch Girls' High School	Skirts or tunics in summer and very long (at times ankle-length) kilts in winter	N/a	Casual dress (no uniform) for last term of year	Yes, cycle club of 20-30 students	Congestion after school an issue and safety of students on busy adjoining roads.

6.2 Extent of school participation in this research

Information regarding cycling to school by students of the participant schools was gained through a student survey, focus groups and teacher interviews. A total of 792 students completed the survey (85% on paper and 15% online). Response rates were approximately 70% for the paper survey¹⁴. It was not possible to accurately determine the response rate for the electronic survey as the number of students in years 9, 11 and 13 at each school at the time of the survey was not recorded. The percentage of surveys received from each school, as a percentage of the total number of surveys (N=792) received from all schools, is shown in Table 4. This shows this percentage ranged from 3.3% of Christchurch Girls' High School to 38.2% for Christchurch Boys' High School. Teacher interviews were completed at all schools. Information regarding the total number of surveys completed, the make-up of the focus groups, and whether focus groups were carried out is shown in Table 4.

¹⁴ Response rates for paper surveys were calculated based on the number of paper surveys requested by schools and the number returned.

Table 4: School participation (N=792)

School	Decile	Total number of surveys completed (N)	Electronic or paper surveys completed	% of total number of surveys at all schools	Focus groups carried out	Make-up of focus groups
Aranui High School	2	71	E	9%	Yes	Six Y10 B Three Y9 G + 1 B. Five Y13 G +1 B Six Y13 G
Cashmere High School	8	41	E	5.2%	No	N/a
Christchurch Boys' High School	9	307	P	38.7%	Yes	Six Y9 B Six Y13B
Christchurch Girls' High School	9	26	E	3.3%	Yes	Six Y10 G Six Y13 G
Hillmorton High School	5	130	P	16.5%	Yes	Six Y9 B Six Y9 G Six Y13 B Six Y13 G
Linwood College	2	54	P	6.8%	No	N/a
Riccarton High School	7	163	P	20.6%	No	N/a

Note: Y=year, B=boy, G=girl

6.3 Data management

Information obtained in the survey enabled calculation of the distance students travelled to school. Distance was calculated on the basis of the network distance (i.e. the distance by road from the intersection closest to a students' home to their school). Unfortunately, this data was only able to be obtained for 569 students as the remaining 223 participants did not provide sufficient information for network distance to be calculated.

Results showed the minimum distance students lived from the school was 119.97m, the maximum 46.78km, the median 2.5km and the mean 4.29km. Results also showed 19% of all students cycled to school. Of these students, 96% lived further than 1km from the school. On the basis of conclusions reached in section 3.4.1, students living less than 1km from the school were excluded from the sample of 569 students as they would be more likely to walk to school. Students living more than 4 km from school were also excluded from the sample, as this was the maximum distance most students in the USA and New Zealand would cycle (Schlossberg et al., 2006; Thornton et al., 2010). As a consequence, the number of surveys included in the analysis was further reduced from 569 to 331. The total number and percentage of surveys analysed per school are shown in Table 5.

Table 5: Total number of surveys by school for those students living more than 1km and less than 4km from their school (N=331)

School	Total Number of surveys completed (N)	% of total number of surveys completed at all schools.
Aranui High School	32	9.7%
Cashmere High School	25	7.6%
Christchurch Boys' High School	93	28.1%
Christchurch Girls' High School	9	2.7%
Hillmorton High School	64	19.3%
Linwood College	24	7.3%
Riccarton High School	84	25.4%
Total	331	

The characteristics of these 331 surveys in terms of gender, year group and decile are shown in Table 6. This shows that the sample size for males and females was uneven, that far more year 9 students were surveyed than year 11 or 13 students and that fewer students were surveyed from low decile schools than from mid or high decile schools. Such unequal sample sizes are a limitation of this research.

Table 6: Survey respondents (N=331)

Characteristic	Percentage		
Gender	63% Male	37% Female	
Year Group	55.3% Year 9 (aged 13-14)	23.2% in Year 11 (aged 15-16)	21.5% in Year 13 (aged 17-18)
Decile	17% Low decile (1-2) (low socio-economic)	45% Mid decile (5-7) (mid-socio-economic)	38% High decile (8-10) (high socio-economic).

Of the 331 students, living more than 1km and less than 4km from school, an analysis was done of the distance students lived from school and the number of students travelling to school by walking, cycling or car (see Table 7).

Table 7: Distance to school for all students, and those who walk, cycle and travel by car. (Note: this only includes students who live more than 1km and less than 4km from school.)

	N	Minimum (km)	Maximum (km)	Mean (km)	Median (km)	SD
Distance to school for all students	331	1.01	3.98	2.19	1.99	.83
Distance to school for those who walk	148	1.01	3.72	1.78	1.71	.57
Distance to school for those who cycle	64	1.08	3.98	2.56	2.45	.81
Distance to school for those who travel by car	83	1.01	3.98	2.38	2.39	.87

These calculations show the mean and median distance travelled for those who live between 1km and 4km from school is respectively 2.19km and 1.99km for all modes, 1.78km and 1.71km for walking, 2.56km and 2.45km for cycling and 2.38km and 2.39km for travelling by car (either as a driver or passenger). Differences between the mean and median distances travelled for each mode indicate that overall, and for walking and cycling, the distances are positively skewed. In addition, calculations show the average distance travelled by car is less than the average distance travelled by bicycle.

Further calculations show the average distance travelled by boys was 2.22km (median 2km), for girls was 2.16km (median 1.98km), year 9 students 2.25km (median 2.07km), year 11 students 2.13km (median 1.98km) and year 13 students 2.15km (median 1.86km).

6.4 How students got to school

In the survey, students were asked how they usually got to school this year (question 8). They were asked to choose only one option. Students were also asked whether they had ever cycled to school (question 10). The results of these two questions are shown in Figure 15 and Table 8. (Note: In subsequent focus groups, it was recognised that a limitation of question 8 was that students sometimes lived in more than one home (due to parents being separated) and used different modes of transport depending on which home they were at.)

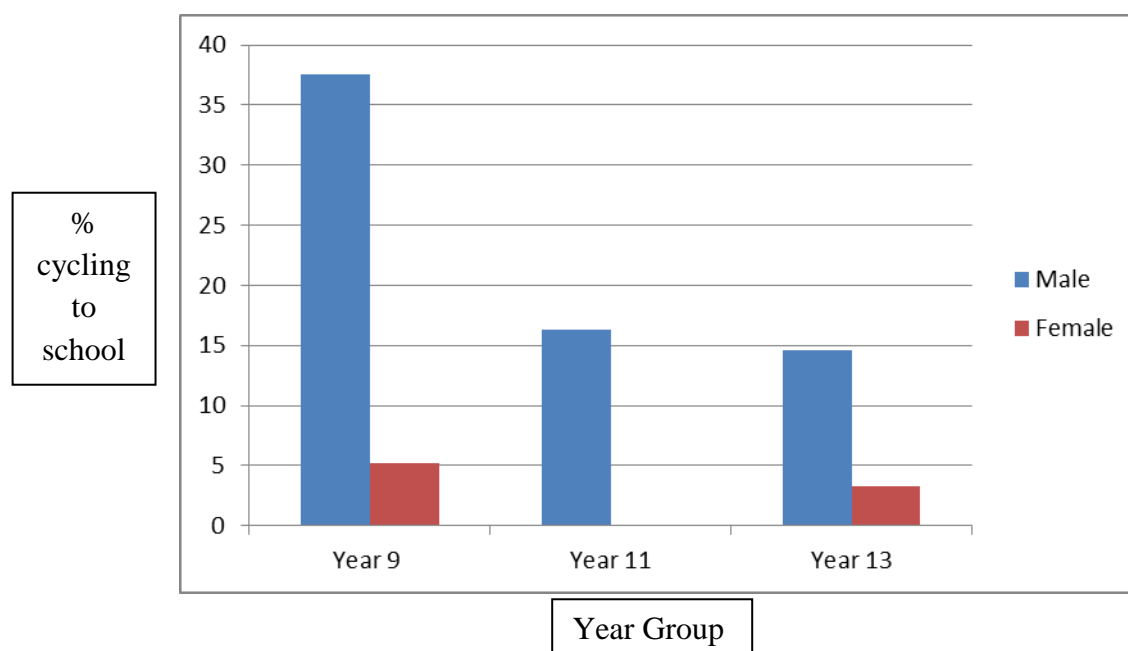


Figure 15: Proportion of students who cycled to school by year and gender

Table 8: How students usually got to school in Christchurch

	N	Car (passenger)%	Car (driver)%	Cycle %	Skate/Ro- ller- blade, scooter %	Motor bike %	Walk %	Bus %	Other %	Ever cycled to school %
All schools	331	19.9	5.1	19.3	3.6	.6	44.7	6	.6	57.5
<i>Gender</i>										
Male	209	15.3	4.3	28.7	5.7	1	38.8	5.3	1	61.3
Female	122	27.9	6.6	3.3	0	0	54.9	7.4	0	52.3
<i>Schools</i>										
Aranui High School	32	21.9	6.3	3.1	0		69	0	0	37
Cashmere High School	25	16	0	12	12		48	8	4	61.9
Christchurch Boys' High School	93	11.8	5.4	47.3	8.6		21.5	4.3	0	74.5

	N	Car (passenger)%	Car (driver)%	Cycle %	Skate/Ro- ller- blade, scooter %	Motor bike %	Walk %	Bus %	Other %	Ever cycled to school %
Christchurch Girls' High School	9	33	0	22.2	0		44.4	0	0	57.1
Hillmorton High School	64	23.4	3.1	4.7	1.5		54.7	12.5	0	58.6
Linwood College	24	33.3	0	4.2	0		45.8	16.7	0	43.8
Riccarton High School	84	21.4	9.5	11.9	1.2		52.4	2.4	1.2	45.2
<i>Year Group</i>										
Year 9	183	16.4	.5	27.3	4.9	.5	42.6	6.6	1.1	56
Year 11	77	27.3	0	9.1	3.9	0	53.2	6.5	0	50
Year 13	71	21.1	22.5	9.9	0	1.4	40.8	4.2	0	67.2

Table 8 shows overall 44.7% percentage of students walked to school, very few students came by motorbike or motor-scooter, and just over a quarter of all students came by car, either as a passenger or as a driver. A fifth of all students came to school by bike and the rest by bus.

Results also show the percentage of girls cycling to school (3%) was much lower than the percentage of boys cycling to school (29%) $\chi^2 (1, N = 331) = 31.94, p < .001$, and girls were more likely to walk, bus, and travel as car passengers and drivers, compared to boys. No girls travelled to school by skateboards, rollerblades, scooters or motorbikes. Figure 15 shows that even in year 9, the percentage of girls who cycled to school was very low (5%), no girls cycled in year 11, and the percentage remained low at 3% for year 13.

When the percentage cycling to school is compared for different schools, Christchurch Boys' and Christchurch Girls' high schools had the greatest proportion of students cycling to school (47% and 33%), although the sample size ($N=9$) for CGHS is too small to be reliable. Aranui, Linwood and Hillmorton high schools had the lowest proportion of students cycling to school (3%, 4% and 5%). Therefore, the rate of cycling was greater at schools of high decile than low decile. A greater percentage of students also walked to Aranui High School (69%) than to any other school, followed by Cashmere (48%), Riccarton (52%) and Linwood (46%). These figures are likely to be influenced by distance from school but also by other factors such as dislike for cycling or public transport, or the opportunity to be driven or drive to school. Comparison of the schools is done with caution however, due to small sample sizes (particularly for CGHS). For the same reason, the comparison of percentages of those who drive is not useful as those students eligible to drive represent an even smaller subset of the sample for each school. The survey did however show higher percentages of students cycling at high decile schools and a chi-squared test showed significant differences in the percentage of students cycling at low, medium and high decile schools $\chi^2 (2, N = 331) = 49.65 p < .001$. The higher proportion of students cycling at high decile schools is contrary to findings of Davison et al. (2008) and Evenson et al. (2003) who found low rates of active commuting in places of high socio-economic status and partially consistent with those of

Rice (2008) who found high rates of walking and cycling in Christchurch in places of both high and low socio-economic status. The discrepancy between my findings and that of Rice in relation to low decile schools may however be because Rice's study combined walking and cycling.

Consistent with research by Horspool (2006), the percentage of year 9 students cycling to school is greater than the percentage of year 11 and year 13 students (see Table 8 and Figure 15) $\chi^2 (2, N = 331) = 16.75 p < .001$. Perhaps, correspondingly, results also show the percentage of students that travel as car passengers is greater for year 11 and 13 students than for year 9 students. However, the percentage travelling using other modes does not vary greatly between year groups, with the exception of car driving being prevalent for year 13 students due to their eligibility to drive.

Results also show that although 19.3% of students cycled to school, 57.5% had cycled at some time in their lives to school, with boys reporting cycling to school at a slightly higher rate (61.3%) than girls (52.3%). These figures contrast with actual cycling rates of 28.7% for boys and 3.3% for girls. The differences between the ratios for girls and boys of those who had ever cycled to school and those who currently cycle could be related to similarities in views towards cycling when children are young and differences as they age (Horspool, 2006). The percentage of those who had ever cycled was higher for year 13 than for other year groups. This could be because older students had been at school longer and therefore had more potential years to cycle or could be indicative of a change in attitudes towards cycling over time. Further research would be required to investigate this.

For non-cyclists, results show that (with the exception of boys saying they lived close enough to walk), females consistently gave more reasons for not cycling to school than males (see Figure 17). As shown in Figure 18, they also show year 11 and 13 students fairly consistently gave more reasons for not cycling to school than year 9 students. These results are consistent with the percentages of students cycling to school as the percentage of year 11 and 13 students and females cycling to school were lower than for other groups. Therefore, these groups are likely to have more reasons for not cycling to school.

The high number of year 11 boys who said they did not cycle to school, as they were close enough to walk, could explain why the proportion of year 11 students that cycled to school (9.1%) was more similar to the proportion of year 13 than year 9 students that cycled to school (9.9% and 27.3% respectively), despite the fact that a greater proportion of year 13 students were likely to be able to drive themselves by car.

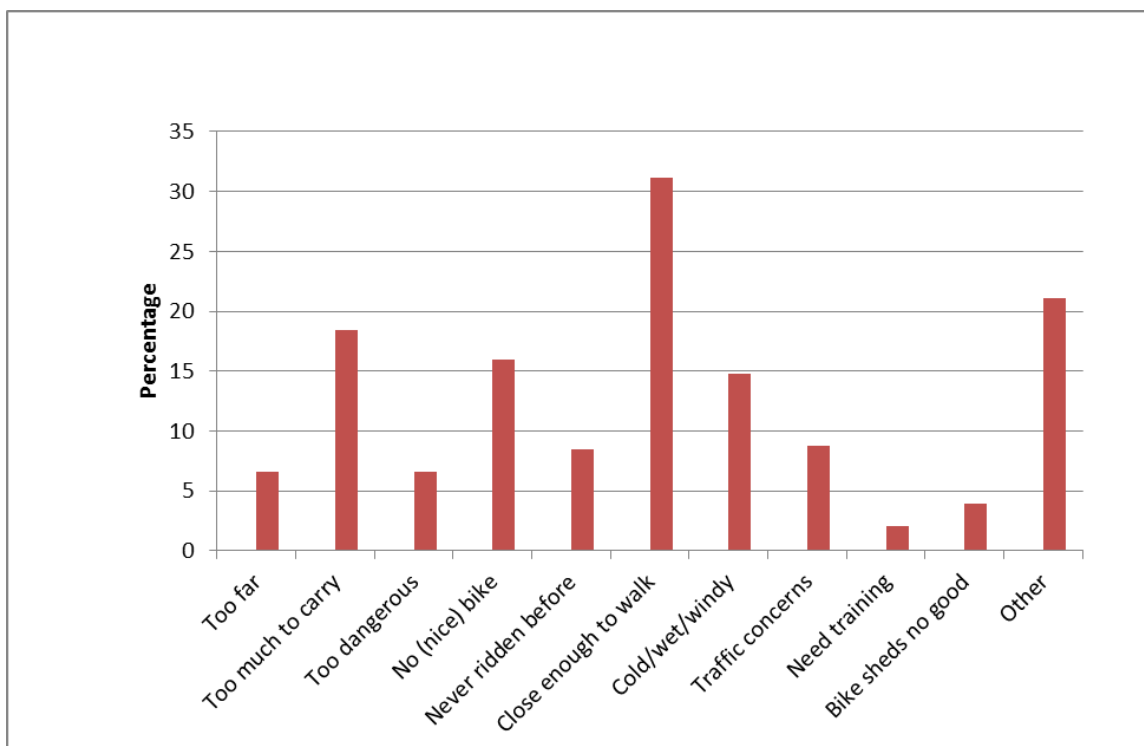


Figure 16: Reasons given by non-cyclists for not cycling to school in Christchurch

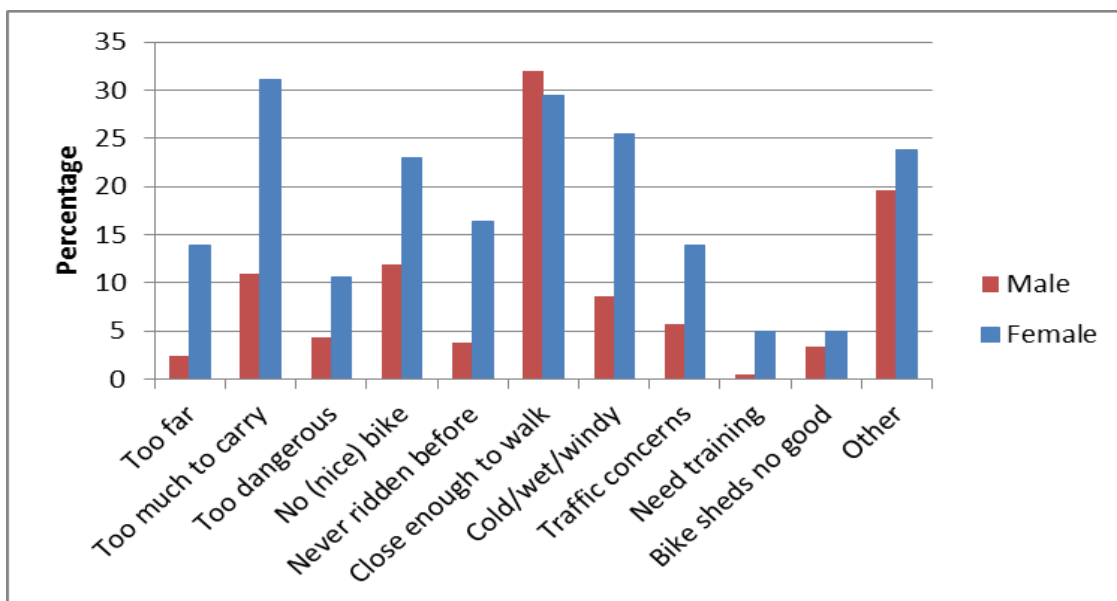


Figure 17: Reasons given by non-cyclists for not cycling to school in Christchurch by gender

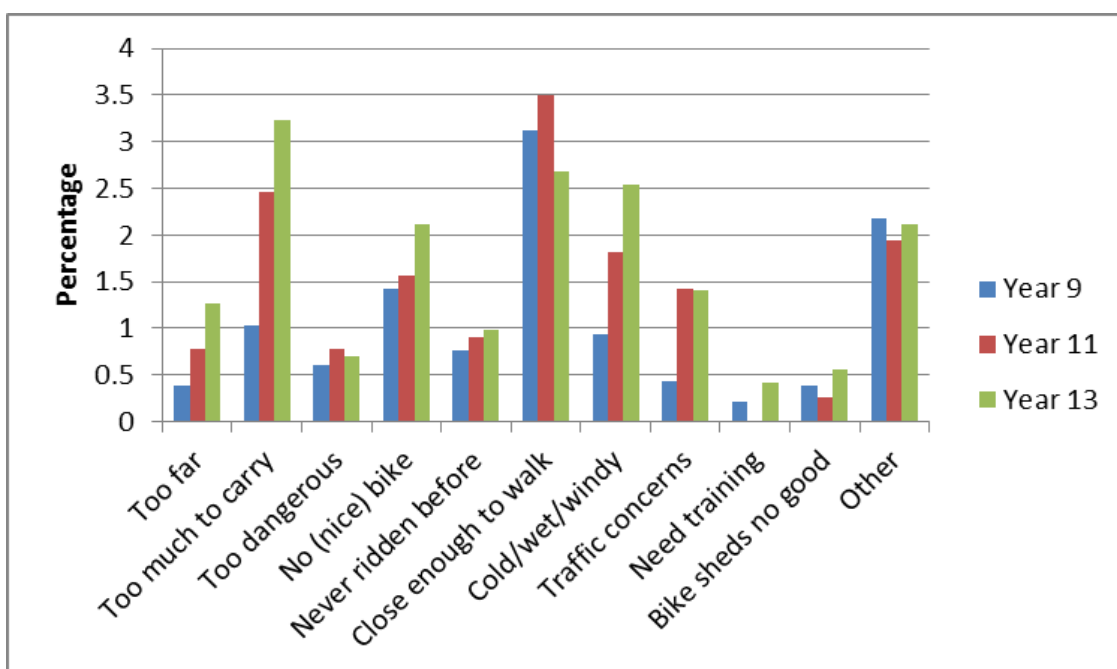


Figure 18: Reasons given by non-cyclists for not cycling to school in Christchurch by year

Table 9: Proportion of students aged over 16 and proportion of these students holding vehicle licences

	N	Total no. of students over 16	% of students aged over 16 with vehicle licence
<i>Total</i>		108	16.9%
<i>Gender</i>			
Male	209	61	18.2%
Female	122	47	14.8%
<i>School</i>			
Aranui High School	32	7	9.4%
Cashmere High School	25	1	0%
Christchurch Boys' High School	93	20	12.9%
Christchurch Girls' High School	9	2	11.1%
Hillmorton High School	64	36	29.7%
Linwood College	24	1	4.2%
Riccarton High School	84	41	23.8%
<i>Year Group</i>			
Year 9	183	6	1.1%
Year 11	77	32	14.3%
Year 13	71	70	60.6%

These results show a greater proportion of males than females over the age of 16 had a vehicle licence and 60% of students in year 13 had licences. Comparison of the schools is difficult due to the small sample sizes.

6.5 Correlations between variables of the TPB and PWM

Two objectives of this research were to determine the predictive validity of the TPB and the PWM with respect to students' decisions to cycle to school and which variables of the TPB and PWM have the greatest influence over teenagers' decisions regarding cycling to school. In order to do this, it was first necessary to calculate *Pearson's r* to determine the correlation between variables of the TPB and PWM. These correlations are shown in Table 10. They show past behaviour was highly correlated with intention. The results also show that all variables were correlated with the intention to cycle to school with the exception of prototype evaluations (both positive and negative).

6.6 Results of the hierarchical regression analysis

As mentioned in section 5.3.2, hierarchical regression analysis was carried out to test whether additional variables of the PWM enhanced predictions of teenagers' intentions after variables of the TPB were taken into account. In the first step of the analysis, gender, year and decile (socio-economic status) were entered as control variables. In the second step, the four variables of the TPB were added: subjective norm (injunctive-parents), subjective norm (injunctive-friends), attitude and perceived behavioural control. In the third, prototype evaluation (imagined- positive), prototype evaluation (imagined-negative), prototype similarity, willingness, prototype evaluation (impression), subjective norm (descriptive-parents) and subjective norm (descriptive-friends) were included as independent variables. The results of the hierarchical regression analysis are shown Table

11. As the measure of past behaviour was highly correlated with intention (see Table 10), past behaviour was not used as an independent variable when assessing the contributions of the TPB and the PWM.

Table 10: Pearson Product - Correlations between variables of the TPB and PWM

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Attitude	-												
2. Subjective norm (friends)	.57**	-											
3. Subjective norm (parents)	.47**	.54**	-										
4. PBC	.28**	.26**	.38**	-									
5. Willingness	.41**	.36**	.29**	.08	-								
6. Intention	.58**	.68**	.64**	.27**	.43**	-							
7. Prototype evaluation (imagined - positive)	.29**	.05	.06	.14*	.09	.07	-						
8. Prototype evaluation (imagined - negative)	.12*	.08	.05	.06	-.02	.01	-.01	-					
9. Prototype similarity	.29**	.29**	.24**	.14*	.28**	.31**	.26**	.17**	-				
10. Prototype evaluation (impression)	.34**	.32**	.32**	.28**	.21**	.29**	.30**	.20**	.44**	-			
11. Descriptive norm (friends)	.34**	.45**	.32**	.13*	.19**	.44**	.09	.14*	.33**	.26**	-		
12. Descriptive norm (parents)	.13*	.03	.16**	.09	.17**	.14*	.02	.00	.18**	.15*	.03	-	
13. Past behaviour	.38**	.50**	.57**	.18**	.27**	.79**	-.01	-.04	.25**	.19**	.40**	.13*	-
<i>M</i>	0.40	3.82	4.51	5.75	3.04	2.94	4.29	4.99	3.72	54.11	2.70	2.42	1.91
<i>SD</i>	1.42	1.66	1.70	1.41	1.45	2.18	1.01	1.13	1.77	23.82	1.56	2.06	1.51

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 11: Hierarchical regression analysis predicting intention to cycle to school by variables of the theory of planned behaviour and Prototype/willingness model, controlled in Step 1 for demographic factors.

		Step 1		Step 2		Step 3	
		β	$R^2 \Delta$	β	$R^2 \Delta$	β	$R^2 \Delta$
1	Gender	-.25***	.17***	-.09	.44***	-.04	.02*
2	Year	-.11		-.05		-.03	
3	Decile Group	.23***		.07		.05	
4	Attitude			.21***		.19***	
5	Subjective norm (friends)			.35***		.31***	
6	Subjective norm (parents)			.31***		.30***	
7	Perceived behavioural control			-.02		-.002	
8	Prototype evaluation (imagined-negative)					-.06	
9	Prototype evaluation (imagined - positive)					-.05	
10	Prototype similarity					.04	

11	Willingness	.10*
12	Prototype evaluation (impression)	-.03
13	Descriptive norm (parents)	.02
14	Descriptive norm (friends)	.10*

Note: *** $p < .001$ ** $p < .01$ * $p < .05$

The results of step 1 of the hierarchical regression analysis showed gender and decile group were significant but year group was not and together these three demographic variables explained 17% of the variance in intention to cycle. It is noted that year level on its own may be significant but not when combined with gender and decile group. In step 2, the TPB variables explained an additional 44% of the variance over and above demographic variables. Table 11 also shows attitude and subjective norm (friends and parents) were significant predictors of intention to cycle (in step 2) and when gender, year and decile group were combined with variables from the TPB, none of these three factors were significant. In step 3 of this analysis, the PWM variables explained an additional 2% ($p < .05$) of the variance in intention over and above variance already explained by demographic variables and TPB variables. Of the PWM variables, only willingness and descriptive norms (friends) significantly predicted intentions to cycle. Step 3 also showed significant predictors of intention to cycle were subjective norms (friends and parents), attitudes, willingness and descriptive norms (friends). Therefore, when the variables were regressed in this order, the variables of the TPB explained 44%; and prototype perceptions, willingness and descriptive norm from the PWM explained a further 2% (see Table 11). Therefore, for this analysis, variables of the TPB were the principle contributors to intention to cycle to school.

To confirm the removal of past behaviour due to its high correlation with intention, the hierarchical regression was re-run with past behaviour included. In step 3, results showed past behaviour to be significant, in addition to the five variables as identified when past behaviour was not included i.e. subjective norms (friends and parents), attitudes, willingness and descriptive norms (friends). Therefore, this analysis confirms the influence of these five variables.

6.7 Results of surveys, focus groups and staff interviews using variables of the TPB and PWM as a framework

The results of surveys, focus groups and staff interviews are discussed below in relation to the three intrapersonal variables that in accordance with the TPB and PWM influence behavioural intentions and/or behavioural willingness – subjective norms, attitudes/ image and perceived behavioural control. In accordance with the ecological model adapted from Sallis et al. (2006), behaviour setting is also considered.

6.7.1 Intrapersonal factors

6.7.1.1 Subjective Norms

As mentioned in Chapter 4, subjective norms can be considered in terms of both injunctive and descriptive norms. Furthermore, these norms can relate to parents (mothers and fathers) and friends. Consequently, for the discussion that occurred in focus groups, injunctive norms and descriptive norms are considered with respect to mothers, fathers and friends.

Injunctive norms (what significant others think one ought to do)

Influence of parents

Injunctive norms in relation to parents/caregivers were measured in the survey in section 2, questions 2, 4 and 6. (Survey questions related to ‘parents’ and were not further divided to

differentiate between the influence of mothers and fathers.) Results, as shown in Table 12 show the means and standard deviations for responses to these questions:

Table 12: Results for questions 2, 4, and 6 concerning injunctive norm- parents

Question	n	Mini- mum	Maximum	Mean	Std. Deviation
Q2 Parents think should ride (1= <i>disagree</i> , 7 = <i>agree</i>)	318	1	7	3.78	2.163
Q4 Parents disapprove/approve (1 = <i>disapprove</i> , 7 = <i>approve</i>)	317	1	7	5.23	1.937
Q6 Parents think I should (1 = <i>should</i> , 7 = <i>should not</i>).	320	1	7	4.50	1.943
Mean of Q2, 4 and 6 (Question 6 was reverse scored.)				4.51	1.7

As the overall mean for Q2, Q4 and Q6 is greater than 4 (neutral), parents tend to be slightly more positive than negative with respect to their children cycling to school.

The influence of injunctive norms in relation to parents was also evident in the students' responses to many of the questions in focus groups. In particular in questions 8 and 9, students were specifically asked to write down and then discuss what their mothers/female caregivers and fathers/male caregivers would say if they said: "*I thought I might bike to school.*" As it was considered likely that the influence of mothers and fathers on decisions of students to cycle to school was likely to differ due to gender differences, the two were considered separately.

Influence of mothers

Most Christchurch students in focus groups said their mothers would allow them to bike to school if they wanted to, with only one saying her mother would not let her bike to school. Other students said their mothers would mention safety (including wearing helmets); offer to take them in the car; offer their car so they could drive themselves; encourage them to do something healthy; be suspicious of their motivations; or laugh at them because they thought it was embarrassing for their children to bike to school.

Influence of fathers

No students said their fathers would prevent them from biking to school or offer them their car to drive to school. Therefore students' perceptions of their parents' attitudes to cycling were similar in respect of their mothers and fathers. This finding differs to that of Krizek, Johnson, and Tilahun (2005) who found men and women's perceptions of safety varied and men were more likely to consider an area to be safe for cycling, compared to women.

Comments by students, indicated fathers were concerned for their children's safety. One year 9 boy at CBHS who was driven to school said:

My Dad would be concerned about my safety. My Dad would just argue saying there's no point, just get in the car, it's so much easier and efficient too.

Consequently, the boys' safety was important to his father and in his father's mind outweighed any costs in terms of his time, financial costs and any other costs associated with driving to school.

In contrast to mothers, fathers were more concerned about the ability of their children to bike to school but similar to mothers encouraged them for health reasons. Some students also said their fathers also would laugh at the suggestion they might cycle. However, rather than this laughter being related to embarrassment, students said it was because their fathers would think it was highly unlikely they would ever cycle to school.

Influence of friends

Like parents, what friends thought one ought to do (injunctive norms) could also influence a student's behaviour. Injunctive norms were measured in the survey in section 2, questions 3, 5 and 7 in relation to friends. Results, as shown in Table 13 show the means and standard deviations for responses to these questions:

Table 13: Results for questions 3, 5 and 7 concerning injunctive norm – friends

Question	n	Minimum	Maximum	Mean	Std. Deviation
Q3 Friends think should ride (1= <i>disagree</i> , 7 = <i>agree</i>)	318	1	7	2.92	2.045
Q5 Friends- approve/disapprove (1 = <i>disapprove</i> , 7 = <i>approve</i>)	321	1	7	4.39	2.016
Q7 Friends think I should (1 = <i>should</i> , 7 = <i>should not</i>).	320	1	7	4.14	1.854
Mean of Q3, 5 and 7 (Question 7 was reverse scored.				3.82	1.66

As the overall mean is less than 4, friends tend to be slightly more negative than positive with respect to their friends cycling to school.

When asked in focus groups what their friend would say if they said they thought they might bike to school, many students said their friend wouldn't care or would be indifferent while others said their friends wouldn't believe them or would discourage them. Several year 9 students said their friends might bike with them, and in general, consistent with Horspool (2006), younger students were more open to the idea of cycling to school than older students. Many students however, thought riding to school was embarrassing. At times such comments were about the type of bike, but often it was about being seen on a bike. Contrary to Horspool's conclusions, a year 9 boy at HHS said it was embarrassing to ride a bike and that

other people would mock and tease you if you did, particularly an uncool bike. Comments by older students mostly related to disbelief from their friends and embarrassment:

Girl 1: My friends would probably laugh and say I'd like to see that happen.

Interviewer: Cause they wouldn't believe it?

Girl 1: *'You go girl'*.

Girl 2: They'd laugh and be like –*'oh that's cool'*.

Interviewer: [Looking at girl 1]. Laughing?

Girl 1: Yeah.

Girl 3: *'You're funny ha ha'*.

Interviewer: So kind of not believing you, funny?

Girl 3: Pretty much.

Being embarrassed was also an issue for students at HHS but less so for students from CGHS and CBHS. This may have been due to greater percentages of students cycling to CGHS and CBHS as shown in Table 8 and consequently the importance of descriptive norms, (to be discussed further below). Discussion of cycling as being “*embarrassing*” is also congruent with research by Underwood, Handy, Paterniti and Lee on why teens abandon cycling (2014) where cycling was described as an embarrassment.

As with parents, students said friends would express disbelief if they said they might cycle to school. They also said their friends would instead encourage them to walk with them in order to be social. A year 13 boy at HHS described how walking was more social than biking as with biking it's not easy to talk to others as they are usually riding in front or behind. Further comments regarding sociability included those of year 13 girls at HHS who thought having a bike was a hassle if friends decided to go to the shops after school, which another girl then described as “*anti-social*”. In contrast, a year 13 girl at CGHS planned to walk home with her two friends (with her bike) after the focus group so she could talk to her friends, even though it would take her much longer to walk than cycle.

These comments are consistent with a desire to be sociable when travelling with peers as discussed in section 3.2.5 and fits with conclusions of Pooley et al. (2005) and Manning and Allen (1987) regarding the desire by adolescents (particularly girls) to socialise with peers more and more as they age (see discussion section 3.2.5).

Cycling was also seen by students as embarrassing as it meant they were by themselves, i.e. others may think may not have friends. Consequently, students potentially thought they were more likely to be subject to ridicule by others. Year 13 girls at AHS said they would be embarrassed riding a bike. When asked why they said:

Girl 1: Oh just a lot of riding a bike...

Girl 2: Yeah people laugh at you and say '*ah you're riding a bike*' you know.

Interviewer: So they wouldn't laugh at you if you were walking?

All: Nah

Other students thought cycling was embarrassing because friends didn't cycle and cycling wasn't cool:

Girl 1: Because your friends are doing something different to you..:

Interviewer: You'd be by yourself riding along?

Girl 1: They'd laugh at you.

Me: They'd be walking?

Girl 1: They'd laugh.

Girl 2: And be cooler than you.

This conversation highlighted the importance of injunctive norms, as students indicated friends would think badly of them if they cycled.

Summary

When the influence of the injunctive norm for parents and the injunctive norm for friends is compared, hierarchical regression, as discussed in section 6.5, showed friends to have slightly more influence than parents. This finding is consistent with those of Bukatko (2008) and Youniss (1992) that peer groups shape adolescents' behaviour. It should however, be treated with caution as findings of researchers have concluded that students' travel behaviour continues to be influenced by their parents through high school (Emond & Handy, 2012; Hunter & Youniss, 1982; Mitra & Buliung, 2015).

In summary, in agreement with Pooley et al. (2005) and Manning and Allen (1987) students favoured their friends sticking to forms of transport where they could socialise with them and cycling was generally not favoured, except perhaps by a few younger students. Students also considered cycling to be embarrassing because friends didn't cycle and due to the need to wear helmets. (The wearing of helmets, along with other clothing, will be discussed in section 6.6.1 in relation to attitudes and image.) The findings of focus groups indicate injunctive norms are important but that descriptive norms also play a part. Previous research recognises different types of norms serve as predictors for different activities (Park & Smith, 2007). Results of the hierarchical regression analysis showed injunctive norms to have a greater influence over cycling to school than descriptive norms. The results of focus groups in this research however, show the influence of both injunctive norms and descriptive norms is likely in relation to cycling. Further research could be undertaken to further examine this in greater detail.

Descriptive norms

Descriptive norms were measured in the survey in section 2, question 12 in relation to friends and question 13 in relation to parents/caregivers. Question 12 asked students to make an assessment on a 7-point scale (1 to 7) in response to the following statement: "*Think of the five people you know best of your age. Of these five people, how many always or sometimes cycle to school?*" (0,1,2,3,4,5). In question 13, students were provided with the following statement: "*One or both of my parents/guardians bicycle frequently*". They were then asked

to circle an answer from 1-7 where 1= disagree and 7=agree. Results showed the following means and standard deviations for responses to these questions:

Table 14: Results for question 12 and 13 concerning descriptive norms for both friends and parents

	N	Minimum	Maximum	Mean	Std. Deviation
Q12 No. of friends cycling? (0,1,2,3,4,5)	321	1	6	2.70	1.557
Q13 Parents biking? (1= disagree, 7=agree).	319	1	7	2.42	2.060

These results showed that of the five people students knew best of their age, on average approximately two of these people always or sometimes cycled to school. Results also showed it was more likely that parents/guardians didn't bicycle frequently.

Hierarchical regression analysis as reported in section 6.6 showed descriptive norm in relation to friends influenced the intention of adolescents to cycle to school but that descriptive norm in relation to parents did not. Therefore consistent with Emond and Handy (2012), Hunter and Youniss (1982) and Mitra and Buliung (2015), these results show what friends do, has more influence than what parents do.

Influence of parents

When asked directly in focus groups whether any of their parents cycled, many students mentioned their parents cycled for recreation purposes. However, cycling to work on a regular basis was rare, with only one student saying her mother biked to work most days. Several students said their parents cycled to work occasionally, one said he had an uncle that cycled to work, and another that her mother cycled if the weather was good. Where parents avoided bikes, couldn't ride bikes or disliked bikes, their views seemed to influence their children. One year 13 girl who walked to school, and said she hadn't ridden a bike for two or

three years, said: *“Mum avoids bikes - like me.”* Consequently, while hierarchical regression indicated students were not influenced by what their parents did, comments by students in focus groups indicated students were influenced by the actions of their parents.

Influence of friends

Of the 69 students spoken with in focus groups, only two people had cycled to school on the day of the focus group, although three more said they usually cycled to school. In general, when students were asked in focus groups whether what their friends did affected how they got to school, they mostly answered *“no”*, seemingly wanting to give the idea that they weren't influenced by their friends. However some said *“kind of”* and one year 9 girl confusingly said: *“No. Not really. They do what they want to do and I just follow what they do.”*

When asked directly in focus groups whether any of their friends biked to school, students often seemed to struggle to think of people who did. Due to the small percentage of students that cycle to school in Christchurch, this was perhaps not surprising. Descriptive norms however influenced the decision of students not to cycle to school, as for most people their friends didn't cycle. Therefore, it seemed cognitive dissonance existed whereby some students said they were not affected by what their friends did, whereas in reality they were. The importance of descriptive norms is consistent with conclusions by Orsini (2005) regarding the importance of peer pressure and by Terry et al. (2015) regarding social identity theory. The answering of questions in a manner that is not accurate or truthful is also recognised as a characteristic of focus groups and surveys and is also referred to as “response bias”(Hayes, 2000, p. 92).

Summary

Although in focus groups, descriptive norms related to parents and friends were found to influence high school students, hierarchical regression showed the influence of what friends do (descriptive norm- friends) to be significant but not the influence of what parents do (descriptive norm- parents).

Hierarchical regression also showed descriptive norms in relation to friends had less influence than injunctive norms in relation to friends (see Table 11). However, focus groups indicated both were relevant.

Culture, ethnicity and race

In addition to norms related to friends and parents, norms can also be related to culture, ethnicity and race (Betancourt & Lopez, 1993). A limitation of this research was that students weren't asked to identify their culture, ethnicity or race in the survey or in focus groups. Consistent, however, with the conclusions of Steinbach et al.(2011) and Green et al.(2012), these factors are likely to have influenced the students' answers. Some conclusions can be made regarding the effects of ethnicity, culture and race based on comments made by students in focus groups, as in some cases it was possible to guess a student's race based on their name and appearance, or students specifically mentioned their ethnicity. Students in focus groups came from a variety of cultural, ethnic and racial backgrounds including European/Pakeha¹⁵, Maori, Pacifica, Indian, Jewish and Russian. Comments made by students could not be considered representative of a specific culture due the lack of frequency of these comments. However, comments made by three students of Pacifica and Maori decent provide some insight into cultural differences. For example, the actions of the mother of a year 13 boy at CBHS who identified himself as Pacifica said his mother would offer him her car and be happy to be at home herself without her car. Such actions were perhaps influenced by culture, as it appeared this boys' mother put his transport needs before her own – a general concept uncommon in European/Pakeha culture but more common in Pacific culture (Schoeffel et al., 1996). A further example was a comment by a year 9 Maori girl at HHS who said her Mum didn't work but liked to “*drop everyone else to school*” and a year 9 Pacifica girl at AHS who said she lived with “*a lot of people*” who travelled by car, bus, or walked to work or school. In interviews, teachers also referred to ethnicity having an effect on the way students travelled. At HHS, a teacher said it was common for ex-refugees to be driven to school by their parents. He described the parents of these students as “*safety-conscious*” and “*over protective—especially of girls*”. A teacher at RHS also commented that a greater percentage of Asian parents drove their children to school compared to parents of

¹⁵ A white New Zealander as opposed to a Maori.

other ethnicities, and a large proportion of these parents drove into the school grounds to drop off their children in the mornings and pick them up in the afternoons.

Consistent with conclusions by Betancourt and Lopez (1993) and Matthews (1992), however, it is difficult to disentangle ethnic effects from other social considerations. Bearing this in mind, in the examples above, the number of siblings in a student's family and whether a mother worked outside the home, may have influenced how likely parents were to lend their car to their children during the day or drive their children to school. Further research would be required to better understand the link between culture, ethnicity and race, and the reasons why teenagers don't cycle to school in NZ.

In summary, cultural differences exist between different ethnic groups in relation to cycling to school and in accordance with the findings of Green et al. (2012), it is likely that cycling is an indicator of marginality for minority groups. However, as students weren't asked to identify their culture, ethnicity or race in the survey or in focus groups, it is difficult to make firm conclusions as a result of this research. Furthermore, based on conclusions by Betancourt and Lopez (1993) and Matthews (1992), specific factors underlie culture, ethnicity and race and therefore one should be wary of making conclusions based purely on these factors as other factors will also apply.

6.7.1.2 Attitudes/Image

Consistent with the TPB, attitudes are a function of a person's beliefs and their overall evaluation of a behaviour and decisions about whether or not to cycle to school can also be affected by attitudes in relation to a particular behaviour (Ajzen, 1991). Attitudes were assessed in relation to question 1 of focus groups where students completed the sentence "*for me, regularly riding by bicycle would be...*", and in section 2 of the survey in questions 20, 21, 22 and 23 (see Appendix N). They were also assessed by comments made in focus groups in relation to image, clothing and hair, helmets, prototype evaluation and prototype similarity, gender stereotypes, social stereotypes, social reactivity, and the combination of factors.

Image, clothing, hair, and helmets

Image

As discussed in chapter 4, adolescence is a time when identity, self-esteem and peer relationships are very important (Aldous, 1983) and image is particularly important to adolescents (Bukatko, 2008). Seven students in section 1, question 11 of the survey gave answers related to image as reasons why they did not usually cycle to school. Examples given in focus groups were:

Girl 1: I mean if I had to bike, I mean my image wouldn't be my main concern but ...

Girl 2: If you were in a rush and desperate of course.

Girl 3: But then in summer. It's like really sweaty. You get to school and you like smell. And you're make-ups all gone - argh.

Girl 1: That's another problem, you know with your whole reputation, you know...make up and what not.

Some students also thought cycling did not fit with their image or view of themselves. A year 13 girl at HHS said “*honestly I would look ridiculous*” and another gave “*looking stupid*” as a reason not to cycle. In answer to the question: For me regularly cycling to school would be... they gave answers such as “*ridiculous*”, “*crazy*”, “*a funny idea*” and “*fun to watch*”. These comments are congruent with those made by Asian women in London who described cycling as “ridiculous” (Steinbach et al., 2011, p. pg1126) and “an absurd suggestion” (Green et al., 2012, p. 19). Overall, there was a general consensus among this group of girls that (apart from one girl who cycled) they were never going to cycle and they couldn’t imagine why anyone would want to.

Several students thought cycling to school was bad for their image. When asked what a friend would say if they said “*I thought I might ride my bike to school next year*”, one year 9 boy at CBHS, who was driven to school, said a friend would say “*guts*” meaning shame. A year 13 girl at AHS said:

Girl: Like if it was an activity with my family and friends and stuff. I'd go mountain biking but that would be probably be like nowhere to be seen.

Interviewer: No-one would see you?

Girl: Yeah like and I wouldn't know them anyway, so...and everyone else is riding a bike.

Interviewer: Whereas biking to school people would see you and people would see you?

Girl: I'd laugh at myself biking.

Comments regarding cycling with family and friends highlighted the importance of descriptive norms (Forward, 2009), as the girl said she would cycle if everyone else was doing it but not if they were not.

Some embarrassment for year 13 girls also seemed to stem from a desire not to be seen doing any physical activity:

Girl 1: My friends would laugh and tell me not to do it. They'd say, '*Don't do that*'.

Interviewer: Cause why?

Girl 1: Cause they don't like it when I do physical activities.

In summary, high school students were concerned about their image cycling. This is consistent with Carver et al.(2013) and Horspool (2006) who concluded high school children were more likely to be concerned about their image cycling and think cycling was uncool compared to children at primary school. Furthermore, as cycling is often considered by many to be a “childish activity” (Allender et al., 2006, p. 831) it is likely younger students will have more positive attitudes to cycling to school than older students. The conversations above indicate image was an issue for boys and girls at both year 9 and year 13, however on balance it was the greatest issue for year 13 girls.

Clothing and hair

Clothing and hair are two elements that contribute to a person's appearance and overall image and can also affect whether students cycle to school. Only two students in section 1, question 11 of the survey gave their hair as a reason under "other" as a reason why they did not usually cycle to school. Three students gave skirts or helmets as reasons. Clothing and hair were however mentioned by a lot of students in focus groups when discussing reasons for not cycling.

The need for specific clothing when cycling was also mentioned by some students in focus groups. A year 13 girl at HHS explained:

Like you know if they're going for like the whole high heels look and they're like pedalling a bike, they look completely out of character.

Another year 13 girl at HHS who wore casual clothing to school also said:

And for year 13s, some girls like you know dress up. I like to wear my heels like you know if you do your hair... Like you're not going to pedal with your high heels.

These comments, and general agreement from the group, showed the idea of cycling in nice clothes was a complete anathema to the girls. Lack of role models probably had a part to play in such beliefs and a lack of awareness of the ability to dress in nice clothes and cycle (as women in countries such as the Netherlands or Denmark do). Therefore, consistent with social norms regarding clothing, and social identity theory (Terry et al., 2015), clothing worn while cycling influences students. Furthermore, the comments about cycling being "completely out of character" are congruent with findings of Manning and Allen (1987) and Youniss and Haynie (1992) regarding social pressures on girls in terms of dress, conformity and social involvement.

School uniforms also influence students' decisions about cycling. In particular, skirts, long trousers or blazers may be more difficult or uncomfortable to cycle in. At all seven schools, students were required to wear uniforms, although year 13 students at AHS and HHS could wear casual clothing if they wished (for details see Table 3). Boys at all schools wore shirts, and long trousers or shorts. Girls wore a mixture of skirts, tunics, kilts and blouses, with AHS

and LHS being the only schools that permitted girls to wear shorts or trousers. Of the seven female focus groups, only two year 9 girls at HHS said their uniform was a reason not to cycle to school. Two girls at RHS gave the fact they wore a skirt as a reason for not cycling to school in response to section 1, question 11 of the survey. Teachers also expressed some concerns about the ability for girls to cycle in skirts or kilts as they flapped about in the wind and could be embarrassing or get caught in the chain. They also considered long kilts, straight skirts and an inability for girls to wear shorts or culottes hindered girls cycling. Overall, skirts of any type were not considered ideal cycling attire and were a barrier to cycling to school. These results were consistent with results of Horspool (2006) who found uniforms were a barrier to cycling for girls at high school.

Boys spoken to in focus groups did not mention their school uniform as a barrier to cycling. However, a year 9 boy at CBHS gave “*wearing a lot of clothing*” as a reason not to cycle to school as he said it would be annoying when you took it off at school and then had to carry it around all day.

The wearing of casual clothing by year 13 students also influenced the decision of girls regarding cycling to school. Girls at AHS who wore casual clothing said they would need to change clothes if they cycled to school and one girl mentioned she liked to wear jeans to school but she didn’t like biking in jeans.

In summary, students considered special clothing and shoes were required for cycling and it was not possible to cycle wearing nice clothes or shoes. Image while cycling was more of an issue for girls than boys. Regulation skirts required as part of school uniforms also made it difficult for girls to cycle. Uniform was not a limitation for boys.

Helmets and other safety clothing

Wearing a helmet was associated by students in Christchurch with image, with students considering cool people wouldn’t wear helmets. Overall, girls had a greater aversion to helmets than boys. A year 13 girl at HHS commented “*nobody looks good in a helmet*”. When asked what a friend would say if they said “*I thought I might bike to school,*” a year 13 girl at AHS said they would laugh at her (and another girl agreed with her). When asked why,

one girl said “*It's the helmet*” and another explained she would carry her helmet if she rode a bike and only put it on if she saw a police car. Consequently she said she took the back streets when she could to avoid the possibility of being seen by the police. Both girls agreed helmets looked funny.

Helmets were also considered to be embarrassing. When asked to finish the sentence, “*for me regularly cycling to school would be...*,” one girl said “*embarrassing*”. When asked why it would be embarrassing she said “*wearing the helmet*” and the conversation continued:

Interviewer: So that's ok [walking], but riding a bike, there's something about it.

Girl 1: It's like the helmet

Girl 2: Yeah the helmet

Girl 3: It's the helmet

Girl 1: I think it is the helmet

Interviewer: What if there was no helmet? If you didn't have to wear one?

Girl 1: It would look a bit better.

Girl 3: The high-vis jackets.

Interviewer: And the high-vis jackets.

Such views on helmets are consistent with those of Rissel and Wen (2011), that young people in particular are dissuaded from cycling altogether due to the need to wear a helmet.

The effect of helmets on hair was also given as a reason by several girls in Christchurch for not cycling to school. Year 13 girls at HHS said:

Girl 1: If you do your hair...

Girl 2: You're not going to wear a bloody helmet.

A teacher at HHS also pointed out a trend to wear hair in a top knot prevented girls from wearing cycle helmets.

Some students could see the safety benefits of helmets and in some cases said they would wear them, despite disliking them. This was evident in the conversation by year 13 girls at CGHS:

Girl 1: I don't like helmets.

Girl 2: I don't like helmets, very much, I wear them but...

Girl 3: I don't like **my** [her emphasis] helmet, because it's the same one I got when I was 7 [much laughing] and it's got like flowers on it so, but I wear it, it's like no big deal but...

Interviewer: So it still fits you?

Girl 3: Yeah. I'm just used to my helmet, it's been drummed into me to wear it. Even when I was scooting to school as a primary school child [laughing].

Girl 4: I wouldn't like the way they looked but I know they're important so...you can't really get away with not wearing one.

A year 9 boy at HHS said he thought that it was dangerous to be hit by a car when you are not wearing a helmet, and another said some people rode their bikes without helmets and “get brain damage when they smash on the ground.” Such comments reflect views recognised by Mullan (2014) that people in Ireland were obsessed with safety, and cycling without a helmet was viewed as highly irresponsible and dangerous. The hassle of carrying helmets during the day was also mentioned by students.

The safety benefits of helmets were also recognised by a year 13 girl. In response to the image showing a group of girls cycling together on a road wearing helmets and high visibility vests, (shown as figure 1 in the focus group questions, see Table 2), a girl at CGHS said:

I circled 'considerate' because they're like biking in a line, they seem quite ordered and they're wearing helmets and what look like vests so they can be seen, so they know they have to be safe on the roads, so other people can be safe.

However, despite recognition of the benefits of such clothing, many students thought it was unattractive. Again in relation to the same question, year 9 girls at CGHS described these girls as self-confident, and said, “*Well, you'd have to be pretty self-confident to wear vests like that*”. The other girls then all laughed. She then said vests were alright, and they were good for safety. A year 13 girl at CGHS who biked to school said on dark mornings she had bike lights and a fluorescent vest which her parents sometimes **made** [her emphasis] her wear. All the girls laughed. She then said: “*I haven't worn them in a while, as they are very embarrassing*”. A year 9 boy at CBHS joked that wearing hi-vis that wearing reflective jackets was no big deal and you could either wear them or not, it didn't make any difference. Therefore overall hi-vis jackets were seen by students as useful but also as unattractive, uncool and embarrassing.

In summary, consistent with Fagan (2014), in NZ the effectiveness of campaigns and social pressure to encourage cyclists to wear helmets has been very successful and the wearing of helmets has been “*drummed*” into people from a young age. The views of teenagers in NZ also are consistent with those in Ireland (Mullan, 2014), whereby safety is utmost in people's minds. However, although teenagers in Christchurch considered helmets had benefits in terms of safety, in general, they considered them to be uncool and cycling to school was considered by many to be embarrassing, particularly by older girls. Wearing of fluorescent vests was also recognised as having safety benefits but also as being unattractive, uncool and embarrassing.

Social stereotypes

A stereotype is defined as “a perceiver's knowledge, beliefs, and expectancies about some social group” (Hamilton & Uhles, 2000, p. 466). Stereotypes in relation to cycling were

identified by Steinbach, et al.(2011), who concluded that for non-white professionals in London, cycling was seen as a low status transport for people who couldn't afford motorised transport. See also discussion in section 3.2.3.

Stereotypes in relation to cycling were also evident in my focus groups. When year 13 girls at AHS were asked in focus groups how not having a car would change their lifestyle– the following conversation resulted:

Girl 1: I've always lived where there is at least two cars, and both my parents drive so if we didn't have a car I'd have to bus and get groceries and I see people that do that and it looks hard, so I couldn't live like that.

Girl 2: Well you see people and they drop stuff.

All: yeah

Girl 2: I feel real sorry for them cause like...they have like little kids with them and it's just like...

Girl 3: I saw someone with a bike on the front of a bus with groceries and I shouldn't laugh cause that was pretty sad.

Some students also saw cyclists as being people to pity (possibly because they couldn't afford a car). In response to question 17, a year 9 boy said he would enjoy riding a bike when he wanted to, *“but not to school cause it's like it's sad.”* Another boy agreed with him.

Stereotypes were also highlighted when students were asked to decide how people would travel (car, bus, bike, walk, motorbike) and explain their decisions (question 11 of focus groups). The findings of question 11 are discussed below in this section under the heading *Prototype evaluation*.

In summary, some students saw cyclists as people to pity and cycling as a lowly form of transport. These findings are consistent with those of Steinbach et al. who concluded that in London cycling was seen by non-white professionals as a low status transport for people who couldn't afford motorised transport.

Gender stereotypes

People may also apply gender stereotypes to certain activities. For example, parents consider girls to be less able at maths compared to boys (Jacobs & Eccles, 1992). Similarly, cycling is sometimes seen by people as a gender specific activity. No boys in focus groups indicated that they saw cycling as something as fitting a boy's image than a girl's, however, this was not the case for year 13 girls:

Girl 1: And my brother biked, but he's a guy and it's like guys...

Girl 2: We've got social pressures on the image. I mean guys do too, but they can bike...

Girl 1: ... my brother is like big and he's muscly and he did like rugby and obviously he's fitter than me.

This girl's statement regarding the comparative social pressures on girls and boys, fits with Simmond and Blythe's findings (1987) that looks and body image are more important to girls than to boys.

Another year 13 girl who walked to school said her boyfriend biked everywhere but the idea of her cycling to school would be fun to watch, hilarious and outrageous.

These comments are also consistent with the conclusions of Simmons and Blythe (1987) and those of Garrard et al. (2006) who recognise the different reasons for girls not cycling, compared to boys, in countries where rates of cycling are low, and where the percentage of boy cyclists exceeds that of girl cyclists.

In summary, cycling was seen by girls to be more appropriate for boys than girls but was not mentioned by boys.

Social reactivity

In addition to the influence of attitudes via a pathway of reasoned decision-making as prescribed in the TPB, students also made decisions regarding cycling to school via a

pathway of non-reasoned, heuristic decision-making as prescribed in the PWM (Gibbons et al., 1998). Although, it was often difficult to distinguish between reasoned and non-reasoned decision-making, particularly in relation to matters such as image, comments made by students suggest non-reasoned decision-making played a part.

In the survey, twelve students in section 1, question 11 gave non-reasoned decisions as reasons why they did not usually cycle to school, with the answer *“I hate biking”* being the most common. Evidence of non-reasoned decision making was also clear in the comments in focus groups by year 13 girl students when discussing barriers to cycling to school in question 3. A year 13 girl at AHS said *“I just don't want to do it. I just don't like bikes so I wouldn't ride it ever”*, and when asked to complete the sentence: *“For me regularly cycling to school would be...”* the same girl said, *“It would be annoying and horrible, because I hate bikes”*. Another girl in the same focus group, said: *“I just don't like bikes at all”*. Year 13 girls at HHS also had similar views with one girl saying *“I just don't ride bikes”*, while another said *“But like...if I go camping or something I'll go on a bike ride but I won't purposely get on a bike unless I'm made to...”*

A few year 9 boys also mentioned their dislike of bikes. When discussing the reasons for not cycling to school, one boy said he didn't like bikes much, and another said in a non-negotiable manner – *“I don't bike to school”*.

Associated with a dislike of bikes and cycling, some students also ruled out cycling to school as it was just not something they did. A year 13 boy at HHS said cycling would not be good because *“It's not my thing – just don't”*. Another also said *“not good because it's not my thing”*. Further to this another said his father would laugh at him if he said he wanted to bike to school and when asked why said, *“cause ah it's probably not the thing I really do”*. Some students said they or their parents just couldn't see any reason to cycle to school. When asked to complete the phrase *“for me regularly cycling to school would be...”* one year 13 boy, who drove to school and lived in a rural residential area on the outskirts of Christchurch replied, *“unnecessary and inconvenient”*.

In summary, comments by students suggested non-reasoned decision-making played a part. Sometimes, however, it was hard to determine whether a decision was made via a reasoned or non-reasoned pathway, e.g. in relation to image. Examples of comments that were more

likely to have been made via a non-reasoned pathway were statements such as “*I hate biking*” and “*I just don’t ride bikes*”. Cycling to school was also seen as pointless by some students.

Prototype evaluation – picture sorting

People’s evaluation of others and categorisation of them in terms of prototypes or images are also often not made on the basis of reasoned decision-making but rather via a social-reactive pathway (Dion, 1973). As a result, people put other people in certain categories based on their looks and often seem to enjoy it. When specifically asked to do this in question 11 of the focus groups, one year 13 boy said: “*I love doing this*”.

Cars

Generally students put people wearing suits, business people, wealthy looking people, important people, famous people, a policeman, an older lady, children, people with jobs and politicians in the car category. At times students identified people based on their clothing, and made conclusions such as that people dressed in business clothes would probably travel by car because “*people don’t tend to wear those kind of clothes when they’re biking*”. Students also put the greatest number of people in the car category; indicative of the car being the dominant form of transport in Christchurch. Car driving was also linked to wealth and students put anyone who looked like they could afford a car in the car category. They also put children in this category as they thought they were commonly transported in cars by adults. Students from a focus group of year 13 boys at CBHS went as far as categorising what type of car the people would drive.

Buses

Students generally put old people, poor people, young people, students, Aucklanders and anyone they thought looked weird in the bus category. Several students also mentioned the existence of the SuperGold Card in NZ, which encourages people over the age of 65 to use the bus as it gives them free travel during off-peak times. Of all the types of people students put in the bus category, perhaps Aucklanders were the only category likely to have a vehicle licence (although “*weirdoes*” may or may not). This implies that in general, students thought only people who didn’t have a vehicle licence caught the bus, apart from in a large city such as Auckland, where a greater proportion of people were likely to commute by public transport.

Walking

Students associated walking with health, youth, old age, lack of money, and strange looking people and consequently, put people who looked athletic, fit, sporty, young, old and alternative in the walking category. Furthermore, students thought only uncool people and poor people walked:

Cool people wouldn't walk. (Year 9 boy AHS)

This one looks like she would walk cause she doesn't look like she could afford a car.
(Year 9 boy HHS)

All the politicians go in the car. They're too cool to walk. (Year 9 girl HHS)

Cycling

Students put young, healthy and fit people in this category. One student who recognised the man in photo 23 as the chief executive of a large Government organisation, and knew of his fondness for cycling, put this man (Roger Sutton) in this category. Movie star, Carey Mulligan (no. 3), was also put in this category by a girl who recognised her and described her as a young hipster. Students decided another movie star, Jennifer Lawrence (no. 17), would also ride a bike as she was active and fit.


Motorbike

Students mostly chose younger men as motorbike riders, although a few also chose some women. People who rode motorbikes were described as wild, famous, and weird (e.g. no. 20, comedian, Jeremy Elder).

Prototype evaluation - Word association


In question 12 of focus groups, students were shown four pictures of people, provided with a list of 15 words, and asked to circle four words to describe each picture.

Table 15: Words used to describe girls on bikes

	<p>Words or phrases used to describe the people in the figure:</p> <p>Safe, independent, feminine, care about the environment, smart, unattractive, fit, self-confident, considerate, didn't care what people thought of them.</p>	<p>Words or phrases not used to describe the people in the figure:</p> <p>Popular, attractive, lazy, dull.</p>
---	--	---

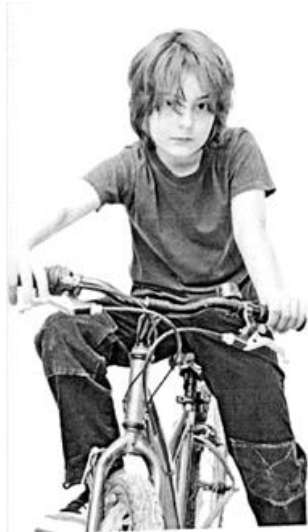
In general, students were not very complimentary about the girls in Table 15, although they did seem very aware of the safety equipment (vests and helmets) worn by those pictured, and their shoes. Some thought they were wearing high heels, some ballet flats and some sandals. Many students thought they looked like a sports team or a training group. Some students thought they should be wearing special shoes for cycling.

Table 16: Words used to describe girl in car

	<p>Words or phrases used to describe the person in the figure:</p> <p>Attractive, popular, independent and self-confident, fit, lazy, doesn't care about her safety.</p>	<p>Words or phrases not used to describe the person in the figure: Smart, unattractive, dull, cares about the environment.</p>
---	--	---

A year 13 girl at CGHS described the girl in Table 16 as having a cliché popular look, and another girl thought she looked like “that all American girl with her own car and everything.” Year 9 boys at CBHS questioned her nationality and enthusiastically thought she looked Swedish. Year 13 girls at CGHS said the photo reminded them that some girls at their school drove to the gym on Riccarton Road after school. Students also often pointed out the girl wasn’t wearing a seatbelt and therefore “*doesn’t care about her safety*”.

Table 17: Words used to describe boy on bike


	<p>Words or phrases used to describe the person in the figure:</p> <p>Unattractive, independent, cool, <i>Doesn’t care about his safety</i>.</p>	<p>Words or phrases not used to describe the person in the figure:</p> <p>Smart, considerate, popular, fit or cares about the environment.</p>
--	--	---

Students’ views on this picture varied depending on their age and sex. Year 9 boys often said he looked unattractive and when asked why, they said “*he’s a guy*”. Year 9 girls also thought he was unattractive. He was also described as cool or as “*thinking he was cool*” by many groups. A year 13 girl at CGHS said:

I put independent because I guess you tend to see, I ... think that children get driven around more, whereas when they get a little bit older, like towards his age, is when you start being more self-sufficient and getting yourself around because you're trusted I guess on a bike.

Safety was again mentioned by students, and he was described as “*not caring about his safety*” because he wasn’t wearing a bike helmet.

Table 18: Words used to describe boy in car

	<p>Words or phrases used to describe the person in the figure:</p> <p>Smart, popular, cool, self-confident, independent, unattractive, dull, considerate, lazy, feminine/ladylike, doesn't care about their safety, cares about the environment, doesn't care what people think of them.</p>	<p>Words or phrases not used to describe the person in the figure:</p> <p>Immature and fit.</p>
---	--	--

A year 13 girl at CGHS said the boy in the photo looked popular and cool, and concluded “*people who have cars tend to have lots of friends.*” Due to their failure to recognise the boy in the picture was driving a left-hand-drive car, students also said he was not wearing a seatbelt and therefore didn't care about his safety.

Summary

Overall, students' views of the people in the four pictures seemed to be mostly influenced by their attractiveness, age and sex, and also by whether they were driving a car or riding a bicycle. One noticeable difference was that students did not describe the people on bicycles as popular, whereas they often used “*popular*” to describe the people driving cars—perhaps

partly for the reason given by the year 13 girl at CGHS that “*people who have cars tend to have lots of friends.*” Regardless of whether the people in the pictures were riding bicycles or driving cars, consistent with Mullan (2014) safety seemed to be topmost in students’ minds. Students also seemed to appreciate the health benefits of riding bikes and thought people driving cars were not fit (although some girls talked about other girls they knew driving to the gym in their cars). As students described all the people in the photographs as independent, this implied that regardless of whether teenagers were in cars or on bikes, independence was recognised.

Prototype similarity

Question 22 of section 2 of the survey asked students to consider how similar they were to the type of person their age who cycled to school. Students were required to circle a number between 1 and 7 with “1” being “*very similar*” and 7 being “*not at all similar*”. Results showed a mean answer of 4.28 (SD 1.7), indicating that most students had a fairly neutral view on whether they did or did not consider they were similar to someone their age who cycled.

6.7.1.3 Perceived Behavioural Control

Consistent with the TPB, decisions about whether or not to cycle to school can also be affected by factors outside a student’s control (i.e. perceived behavioural control (PBC) (Ajzen, 1991). PBC is influenced by control beliefs. As mentioned above in section 4.2.1, PBC has two components –efficacy and controllability. In relation to cycling, the efficacy component of PBC concerns how confident and capable a student is at cycling to school and the controllability component relates to decisions made by others that may affect a student’s decision to cycle to school. Examples of this include the ability to ride a bike and cycle confidence.

Ability to ride a bike

The ability to ride a bicycle is needed before a student can contemplate riding a bike to school. In Christchurch, no students indicated in Section 1, question 11 of the survey that they couldn't ride a bike. Results were calculated for questions 14 and 16, as shown in table 19:

Table 19: Ability to ride a bike

	Mean	Standard Deviation
Q14: "To what extent do you see yourself as being capable of riding a bicycle to school," (1= <i>incapable (not able to)</i> and 7 = <i>capable (able to)</i>).	5.6	1.99
Q 16: "I believe I have the ability to ride a bicycle to school". (1= <i>definitely do not</i> and 7 = <i>definitely do</i>).	6	1.70

As the mean scores for both these two questions were greater than 4, this indicated that students thought they were generally quite capable and able to ride a bicycle to school. Furthermore, no students in section 1, question 11 of the survey said a reason they didn't cycle to school was because they couldn't ride a bike.

All the students interviewed in focus groups indicated they could ride a bike with the exception of one year 9 girl at AHS. Therefore, with the exception of this girl, all children in focus groups in Christchurch had at some stage and learned to ride a bike.

Cycle confidence

While students were generally able to ride bicycles, cycle confidence was also relevant. Results were calculated for question 15, as shown in table 20:

Table 20: Confidence riding a bike

Question	Mean	Standard Deviation
“How confident are you that you could ride a bicycle to school,” (1 = <i>not very confident</i> and 7 = <i>very confident</i>).	5.6	2.02

The mean of 5.6 for question 15, indicated most students thought they were confident riding a bike. Furthermore, in section 1, question 11 of the survey, only 2.1% of students said they needed proper training but 8.5% said they had never really ridden on the road before. However, although survey results indicated in general students were confident cycling, in focus groups it was evident many were not, possibly due to response bias (as previously discussed in section 6.7.1). For some students in focus groups it was evident their confidence wasn't high as they hadn't ridden a bike for a while. A year 9 boy said he didn't feel confident about cycling to school as he hadn't ridden a bike since he was seven-years-old and another said he didn't trust himself biking because he hadn't biked anywhere “*in a while*” and would have to watch himself around pedestrians and cars. Therefore gaps in cycling activity affected teenagers' cycle confidence and influenced their cycling rates.

A lack of knowledge of road rules also contributed to a lack of cycling confidence and was a concern for some students. One year 9 boy at HHS said one of the reasons he didn't cycle to school was because he didn't really know the road rules and consequently he was concerned for his safety. The failure to know road rules was also mentioned by two year 9 girls at AHS. While cycle road safety is taught at some schools in Christchurch, children who miss out on this training must then rely on their parents or someone else to teach them, and sometimes

this doesn't happen. Consequently, more cycle training may be required to increase the cycle confidence of teenagers for those who have not ridden for a while.

Previous bad experiences on bikes also put some students off cycling to school. A year 13 girl at HHS said she'd gone flying off her bike after riding into a car door when she was younger; a second girl said she had once got her handle bars hooked on the side of a bus and got dragged along; and a third girl said she had nearly been hit by a truck. Other students also mentioned being knocked off their bikes. The effect of such experiences would be difficult to change and steps to reduce the risk of accidents such as cycle training or provision of infrastructure would be necessary to avoid these barriers.

The cohort that expressed the greatest concerns in the focus groups about their ability to cycle, particularly in traffic, was year 13 girls. In focus groups, year 13 girls at AHS, CGHS and HHS said they didn't feel confident enough in their ability to bike to school:

So like when it gets too fast, or if I have to slow down, like, stop, like really quickly, I get somehow get really nervous, like somehow the cars, I get really scared...

Survey results also showed year 11 and 13 girls had the lowest cycling rates of all groups, with no year 11 girls cycling and only one year 13 girl cycling to school (see

Figure 15). Results also showed these groups were most likely to indicate their reasons for not usually biking to school, were "*I need proper training*" (see Figure 17). Girls in all age groups were also more likely than boys to say the reason they didn't cycle to school was because they had "*never really ridden on the road before*". Further research would be beneficial to determine why this group lacks confidence riding bikes to school. Students' views on their capability with respect to cycling to school overlapped to a degree with their perceptions of safety, with those perceiving cycling to be unsafe also lacking in confidence. This is consistent with research by Kingham et al. (2011) that separated cycle paths may be particularly useful in attracting potential cyclists, despite the fact they are not always safe, particularly at intersections (Krizek et al., 2009).

6.7.2 Behaviour setting

Consistent with the ecological model, decisions about whether or not to cycle to school can also be affected by factors concerning behaviour setting such as safety, bike ownership, additional equipment and clothing requirements, having too much to carry, cycle facilities provided by the school and less directly, school rules regarding bringing motor vehicles to school and the media.

Safety

In the focus groups, students often mentioned safety as a reason for not cycling to school. This included safety with respect to vehicular traffic and students' personal security. Teachers also mentioned traffic safety and personal security as reasons for students not cycling to school. Safety was also considered in the survey, where students were asked in section 1 to choose the reasons why they did not usually bike to school – "*I think it is too dangerous*" and "*I don't like the traffic*" were given as options. The word "*dangerous*" could have been interpreted either in terms of traffic or in terms of personal security. However, because the prevalent perception in the media and general public opinion in Christchurch is that cycling is unsafe in Christchurch due to vehicular traffic (Norris, 2014), it is more likely students interpreted the word "*dangerous*" to refer to traffic rather than personal security. Due to the differences between the two, these two different aspects of safety are considered separately.

Personal security

Fear for personal security was not mentioned by students in the survey. However, the isolation and social vulnerability of cycling to school was something mentioned by several students in focus groups. One year 9 girl at AHS said:

Well it's like different to walking, cause when you're walking you're like talking to friends. Biking it's just by yourself, you don't have anyone there to like back you up or anything.

A year 13 girl at AHS also mentioned personal security as a barrier to walking to school, and inferred the same scenario was likely if she cycled:

Girl: ...rude people yelling out things from cars. That's happened to me walking home.

Interviewer: yeah, not very nice.

Girl: I was surprised when it happened it was the whole family, like the mother and the two children all doing it.

Interviewer: All yelling?

Girl: Yeah

Students at other schools in Christchurch did not mention personal security in relation to cycling. This may have been because intimidation did not happen as frequently in other parts of Christchurch or because students failed to mention it for some other reason. In a newspaper story in the Christchurch Press a reporter visited Aranui and a resident spoke about her safety and that of her 14-year-old daughter with respect to the gang activity and drugs sold in the area (Stewart & Gates, 2014). As a consequence she said she kept to herself, wished she could live in the country and didn't walk anywhere because she didn't feel safe.

Although this comment cannot be attributed to the entire Aranui community, it indicates that personal security in public spaces is an issue for some people in the area. Further research would be needed to confirm this, however, it is likely students feel less safe on the roads and footpaths in Aranui than in some other suburbs of Christchurch, and this may contribute to low cycling rates at AHS. These findings are consistent with those of McDonald et al. (2010) who found parents were more likely to allow their children to walk or cycle to school when they perceived other people would watch out for them.

In interviews, two teachers also mentioned personal security in relation to how children travelled to school. A teacher at CHS mentioned that a year ago a girl had been murdered at a property next to the school. She also mentioned a fear of students being approached by strangers as a reason for parents not allowing their children to cycle to school¹⁶. This teacher

¹⁶ Interestingly, the teacher's reasoning did not extend to walking.

had taught self-defence in the past and thought crime was a factor contributing to how students travelled to school. As already discussed in section 6.7.1 above, a teacher at HHS also mentioned concern for children's safety by the parents of ex-refugees and said these parents often drove their children to school (in particular their daughters) due to concerns about their children's personal security.

In summary, concern for personal security is relevant in relation to walking and cycling to school, particularly in some neighbourhoods and for some parents. These findings are consistent with findings of McDonald et al. (2010) and Weller and Bruegel (2009) regarding perceptions of the social environment and children's travel mode.

Traffic safety

Results of section 1, question 11 of the survey showed 6.6% of students indicated they thought cycling was too dangerous and 8.8% indicated they did not usually bike to school because they didn't like the traffic.

Previous serious or fatal accidents involving students on bicycles had occurred near three of the seven schools. Congestion after school was an issue of concern at all schools except two (AHS and HHS) which were located on quiet suburban roads. It was a particular concern on wet days when there was more traffic. A teacher at CGHS said:

... at the end of the day, it's chaos out there, it's absolute chaos. You get a back-up of traffic, people can't get out. The parents pull right up— that's the problem and we've also got buses trying to get down there as well. It is dynamite...

Rainy days you just don't want to go home till after they've gone.

I'm here all hours so I don't notice it so much. But if I go out to do bus duty – it is awful. It's worse in the afternoons as everyone is leaving at once. The mornings are not so bad as people get dropped off at different times.

Safety was a particular concern of staff at two schools (LHS and RHS) as they were located on busy roads with an average of up to 23,172 vehicles/12hr/7days (Christchurch City

Council, 2013). Most schools, however, sought improvements in relation to traffic safety in the vicinity of their schools. Teachers recognised these changes often took a long time to achieve. In addition, they recognised changes required a large time commitment from teachers, and this was often difficult in addition to other teaching commitments.

A teacher interviewed at CHS said she thought parents had huge concerns for the safety of their children in relation to how they travelled to school. She said, as a parent, she had been fearful that her daughter and son were going to be knocked off their bikes when they cycled to school. She thought this was exacerbated by a former pupil of the school who had been seriously injured as a result of being knocked off his bike by a bus four years earlier. She thought more cycle lanes needed to be established to help allay parents' concerns. The conclusions of this teacher regarding the importance of parental concerns for their children's safety are consistent with findings of Hunter and Youniss (1992) and Mitra and Buliung (2015) regarding the influence of parents. They are also consistent with conclusions that cycle infrastructure improves the perceived safety for cyclists (Kingham et al., 2011).

Several students in focus groups mentioned fear of traffic as a reason for not cycling to school. This is consistent with research by others who cite fear of traffic as a reason for not cycling (Centers for Disease Control and Prevention, 2002; Pikora et al., 2003; Thornton et al., 2010; Villanueva et al., 2012). Some students said they had seen cyclists nearly hit by cars and this had put them off cycling. Several also said cycling close to cars put them off cycling to school, together with turning across traffic. Another student mentioned buses as being especially dangerous because they often pulled out and couldn't see cyclists: *"They see cars but they don't necessarily see the biker"*. The same student also mentioned pedestrians being a problem as he said many of them didn't see bikes, as they only looked for cars.

Route choice in relation to safety was rarely mentioned by students in Christchurch, possibly because route choice was likely to be considered mostly by those who do cycle (and few did). Consistent with the findings of Villanueva et al, (2012), some students did however say that cycling on busy roads (such as Papanui Road, Bealey Ave) and main roads (such as those in the vicinity of AHS) put them off cycling to school. One year 13 girl at CGHS who cycled to school said she used the small quieter roads and avoided the main road (Bealey Ave) although her younger brother didn't seem to mind using it. A year 9 girl at CGHS mentioned that some of the roads which were the fastest routes to school didn't have cycle lanes and she thought it was scary riding close to the cars on such roads.

Cycle paths hardly featured in the conversation of Christchurch students. This was probably largely due to a lack of cycle paths in the vicinity of their schools and homes. Of the few students who did cycle to school, none of them mentioned using cycle paths. One year 13 CGHS girl who walked to school said if she biked to school, she would have to use the cycle path from CGHS to CBHS but it would be really slow “*as girls and boys are just all over it*” and this put her off using it. She explained that at certain times of the day, students from both schools walk and cycle on the path, even though it was meant for cycling. In accordance with research by Kingham et al. (2011) cycle paths may however be attractive to high school students, particularly those lacking in confidence.

Bike ownership

Current ownership of a bike was also a factor influencing the decision by students to cycle to school. In response to section 1, question 11 of the survey 16% students indicated a reason they did not cycle to school was because they didn't have a “*bike/nice bike*”. While it was not possible to determine from answers whether it was the lack of a bike or a “*nice bike*” that was the main reason, it was possible that some students ticked this box because they didn't have a bike. Several students in focus groups mentioned they either didn't have a bike, they shared their bike with someone in their family or their bike was either too big or they had outgrown it. The girl who had never ridden a bike and a year 13 boy at CBHS were the only two students interviewed in focus groups who had never owned bicycles. The year 13 boy lived about 10km from the school, was from a large Pacifica family and said he had nothing to do with bikes. When asked whether there were any bikes in his family, he replied:

Boy: No Dad's more scared of bikes cause knowing the road and cars going so... that's probably why boys [he had several brothers] don't have bikes.

Interviewer: So scared of getting knocked off?

Boy: Yeah

Ethnicity may have played a part in the views of this boy's father. Further research would, however, be required to examine the relationship between ethnicity and bike ownership.

The type of bike owned by students might also affect students' desire to cycle. As mentioned above, in response to section 1, question 11 of the survey 16% students indicated a reason they did not cycle to school was because they didn't have a *"bike/nice bike"*. Therefore it is possible some students ticked this box because they didn't like their bike and didn't want to use it. A year 13 girl at AHS commented that if everyone had cool bikes, they might use them. A year 9 girl at AHS also said her bike was *"bundy"* – meaning bad. Therefore, for some students, the type of bike they rode affected their decision to cycle to school. The reasons students may have rejected a type of bike was because they associated it with low socio-economic status, as mentioned by Steinbach et al. (2011).

Additional equipment and clothing requirements

In addition to a bicycle, other cycling equipment such as a bike lock, bike helmet, and high visibility clothing is useful. The lack or the quality of this equipment affected some student's decisions about cycling to school and was discussed in focus groups at AHS and HHS.

Too much to carry

A further reason given by students for not cycling to school was having too much to carry. In response to section 1, question 11 of the survey, 18.4% of students indicated a reason they did not cycle to school was *"because they had too much to carry or other places to go before/after school"*. Similar to the answer regarding the *"bike/nice bike"*, it is not possible to tell from the responses whether students ticked this reason in response to the former or latter part of this question. However, it is reasonable to assume some people ticked this reason as they thought the amount they had to carry hindered their ability to cycle. Having too much to carry was also mentioned in focus groups by both year 9 and 13 students, but to a greater extent by year 13 students. Items mentioned by students that were difficult to carry on bicycles included a cricket bat, art materials, a camera, a musical instrument, textbooks, food made in technology and sports gear. Students who brought cars to school (notably the year 13 boys at CBHS) discussed using their cars as places to store equipment they needed at school.

Although some students were aware of ways to carry loads on bikes, such as bike baskets, comments indicated students didn't favour the use of these.

Cycle facilities provided by the school

The number of students cycling to school may be influenced by the cycle facilities provided by schools, such as bike racks, locked bike parking, covered bike parking, showers and lockers. Bicycle parking was provided at all seven schools and at all schools more parking was provided than was used. At LHS, AHS and HHS, where cycling rates were low, large empty bike parks indicated a surplus of bike parking. At CBHS the teacher said there was parking for about 400 bicycles but bike parks were lost following the earthquakes of 2010/2011, as a lockable shed was subsequently demolished. Despite this loss, the teacher said there was no demand for more bike parks. In response to section 1, question 11 of the survey only 3.9% of students indicated a reason they did not cycle to school was because "*the bike sheds aren't very good or they are too full*".

The location of bike parking in relation to students' homes may also influence whether or not students bring bikes to school. A year 13 boy at CBHS said the location of the bike parking at school was a problem as he lived to the west of the school, whereas the bike parking was to the east. Consequently he said it would be a waste of time if he cycled to school, as he would have to cycle over to the bike parking and walk back to his classroom. The location of bike racks was also mentioned by a teacher at RHS, as some students wished the cycle parking area was nearer to the school entrances so they didn't have to bike on the driveways where there were a lot of vehicles.

Bike theft or vandalism of bikes at school may prevent students cycling to school. Bike security was mentioned as a problem at all schools, with the exception of two. Locked bicycle parking was only provided at three schools. However, despite this precaution, students at one of these schools reported bikes were sometimes stolen and four bikes had been stolen from the school the day before the focus groups were held.

The location of bike parking could also influence the likelihood of bikes being stolen from schools. Most bike parking was provided near school entrances. Where bike parking was

more accessible to the public, bikes and bike parts were also more likely to be stolen by members of the public. For example at one school, bikes were parked alongside a driveway public walkway and despite the presence of surveillance cameras, bikes were often stolen. At another school, bike parking was provided near the rear entrance to the school and the installation of security cameras had prevented bike theft. Teachers also said students bought old bikes to school in recognition of possible bike theft. In summary, bike theft is an issue at schools across the city, regardless of decile and influences students' attitudes towards cycling to school.

A flow on effect of bike theft or vandalism is that students' bikes are then not replaced or fixed, and this prevents them cycling to school. A year 13 student at one school mentioned his bike had been stolen from school when he was 14 and he had never got around to replacing it.

Even if an individual has not actually had a bike stolen or vandalised, they may fear the possibility of having a bike stolen or having their bike vandalised, and this fear may be sufficient to prevent them cycling to school. The possibility of bikes being stolen or vandalised was mentioned by students at two schools (one of high decile and one low) as reasons for not cycling to school.

Fear of having other practical problems with bikes also deters students from cycling to school. Some students mentioned the fear and hassle of having a flat tyre as a reason for not cycling. Bike maintenance also seemed to be a problem for many students, particularly, or perhaps sometimes because they rarely used their bikes. Most students owned bikes but many reported their bikes were in bad condition e.g. rusty, flat tyre, no brakes, no pedals, broken chain. This seemed to be an issue for children at all schools, but particularly at AHS, possibly due to the low decile rating of the school. This is consistent with Steinbach et al. (2011) who concluded adult cyclists in London, were more likely to be affluent.

All schools possessed shower facilities in their school gymnasiums however teachers thought it was very unlikely students would use these facilities in association with cycling to school. Lockers were provided at all schools with the exception of AHS. Overall, the availability of showers and lockers at school was not mentioned by students in focus groups and wasn't a major factor affecting cycling to school.

Permission to drive to school

School rules with respect to the bringing of cars to school may indirectly affect the number of senior students cycling to school. This is something students generally have little control over, but which affects the behaviour of students who have a vehicle licence and access to a car.

None of the schools prevented students bringing cars to school, however all but two schools required students to get permission from the school. Although not expressly stated, at schools such as AHS, where very few students brought cars to school, permission was probably not required due to the low numbers. For those schools where permission was required, the bringing of cars was sometimes restricted to certain year groups; permission was required from parents; some discouraged pupils from transporting others; and some prevented students from using their cars during school hours. No schools allowed students to park on school grounds.

The monitoring of the behaviour of students driving to school is not of course the core business of a school. Therefore, although it was fairly widely recognised by schools that some students did not comply with legal or school requirements regarding driving, it was recognised that this was very difficult for the school to control. Examples of this were evident in the following comments from teachers at three different schools:

If you bring a car or motorbike to school you need permission. Probably about 80% of them do.... We don't get them all, but that's the school policy.

Probably only 40-50 cars at any time only have one [student] in, as nearly all students have restricted licences. Doesn't mean to say they only have one though.

Some kids inevitably who don't have permission will still bring a car to school.

In recognition of the difficulty of enforcement, one school had changed its procedures with respect to students bringing cars to school:

In the past we used to have a permit, but perhaps with the change in laws or increased responsibility created by the laws, it just seemed perhaps something that was unnecessary and difficult to police because if a student brings a vehicle to school and parks it outside the school grounds, you're not necessarily going to know anyway.

In summary, school rules and enforcement regarding bringing cars to school were generally unlikely to deter students bringing cars to school and therefore where students had vehicle licences and access to cars, schools did not provide impediments to students driving to school. Students with the option of driving to school would be less likely to cycle to school.

The influence of the media

In addition to physical aspects of the behaviour setting, teenagers can also be influenced by the media (as discussed in section 3.4.7). The influence of the media was evident in comments by some girls in focus groups. When groups were asked in question 12 to categorise people in terms of the transport they were likely to use, the following responses were given:

- 1) A year 13 girl described how some office people bicycle to work – “*like in the movies and stuff*”.
- 2) A year 13 girl described seeing police officers on bikes on 21 Jump Street (a 2012 American action comedy film).
- 3) A year 13 girl recognised one of the photos as being the actress Carey Mulligan and described her as “*a hipster*” as they could imagine her riding a bicycle (without a helmet) in a movie, although not in real life.
- 4) A year 9 girl when she asked whether a car gave you status said:

Well...from the media or from like a movie, and teenagers with their cars, it shows that it gives you status.

While movies were mentioned in a general sense by girls (as above) the movie, “Mean Girls”, was mentioned by two separate groups of year 9 girls in focus groups. When discussing vehicle licences, a year 9 girl at HHS said:

Yip, I'd get one because then I could like go by myself and I could like take my friends home if I need to and I could do a 'Mean Girls'. Because then if people were mean to me. I'd be like "you can drive home" and I'd like not say a word.

When asked what she meant by “*doing a Mean Girls*”, she replied:

It's like the movie. You know and they say [in American accent]: 'You can walk home'.

A year 9 girl made further mention this movie, in relation to Figure 19, below:

Well she looks like that all American girl with her own car and everything. So it's like she's one of those pop... well not popular but you know how they show you know when you're in high school you get your own car which makes you... I don't know – which somehow raises your status as a person I guess.



Figure 19: Girl in car

When asked who “*they*” were, she replied: “*the media [her emphasis] of course. You know they're warping our minds...*” When further prompted to identify a particular part of the media, she replied: “*Mean Girls I guess*” and all the girls laughed.

Mean Girls is a film about a young girl, previously home-schooled in Africa, whose family moves to Illinois, America, where she attends the local high school. As described in the movie trailer, “she encounters all the psychological warfare and unwritten social rules that teenage girls face today” (Varma, 2014, p. np). The movie was released in 2004 and has been described as “acutely hilarious sociology, nailing the servile malice of 15-year-old girls”

(Winter, 2004, p. np). Somewhat ironically, it was loosely based on a self-help book – *Queen Bees and Wannabes: Helping Your Daughter Survive Cliques, Gossip, Boyfriends, and Other Realities of Adolescence* which gives parents advice on how to deal with aggressive behaviour by teenage girls at high school (Behm-Morawitz & Mastro, 2008) (Wiseman, 2002). The mention of the movie by two year 9 girls in Christchurch and the knowledge of the movie by the other girls in each of these two focus groups indicated how popular the movie was.

The use of cars as a means of travel and a status symbol for teenage girls are features of the movie. One of the main girl characters in the movie has a late-model convertible car and gives the other girls rides from school in her car. At one point in the movie the girl with the car argues with her friends, and tells them “*you can walk home, bitches*” – implying this is their punishment.

Based on comments and reactions of the girls in the focus groups, movies such as this, where attractive girls drive cars and give their friends rides in their cars influence the travel behaviour of teenage girls in countries such as New Zealand. This is consistent with the conclusions of Behm-Morawitz and Mastro (2008) (discussed in section 3.4.7) that where consumers identify with particular movie characters, they are more likely to adopt the attitudes, beliefs and behaviours shown.

Summary

In summary, while comments about the movie *Mean Girls* and the influence of the media were given by only a few girls, other girls in the respective groups concurred with their views. As a result of the lack of a direct question in focus groups regarding the influence of the media, it was up to participants themselves to make the link between the media and how they travelled to school. While this link was not made by most focus groups, this cannot be seen as an indication that the media did not influence these groups. Further research on the influence of the media on how teenagers travel to school, and any difference in its influence between girls and boys, would be necessary to explore this link further.

6.7.3 The combination of factors

When asked to give their three top reasons for not cycling to school, many Christchurch students emphasised that the combination of many factors as the main reason for not cycling to school. This would infer a path of reasoned decision-making if all the reasons were carefully weighed up and as a result, a decision was made regarding intention and behaviour. It could also, however, be influenced by non-reasoned decision-making, as the combination and cumulative effect of factors might overwhelm students and consequently their decisions may have been made using a heuristic approach. An example of the combination of factors being too much was given by a HHS year 13 girl who said she had to carry her bag and her camera and “*it’s just too much stuff going on*”. She then elaborated:

Yes, it's usually like just a hassle to get like you know...cause you have to open the garage, make sure the cats don't get out, get the bike, find a helmet that fits, rearrange all my stuff, cause I have my folder that I take with me everywhere [motioning to a large pink ring binder on the desk]. I'd have to sit that on my knees while biking and it would just be a pain.

Therefore, while individually each of the factors the girl listed may have been surmountable, in her mind the combination made it too difficult to cycle to school. Similar statements were made by other students:

- 1) A year 13 girl who wore casual clothes to school:

Girl 1: I don't like wearing helmets and I'd have to wear different clothes, and when I bike I don't wear jeans, I wear shorts or something.

Interviewer: So you'd have to get changed which would be a bit of a pain?

Girl 1: Too much effort –just easier walking.

- 2) A year 13 girl who lived close to school said for her regularly cycling to school would be annoying because she thought by the time she went out the back door, actually got her bike (which involved pushing a button in the garage) and pushed the buttons to open the two electronic gates, went down her long driveway, put the helmet on (which she said would mess up her hair) and locked the bike at school, it was much easier to

walk, particularly as if she walked she could go out the front door and avoid the electronic gates.

- 3) Two other students mentioned it was just too much hassle to cycle to school and that locking a bike took time and was a problem.

Therefore overall, it seemed the combination of factors overwhelmed some students and resulted in them concluding cycling to school was too difficult and getting to school by other means was much easier.

Chapter 7: Cycling to High School in Voorschoten, the Hague Region of the Netherlands

This chapter presents the results of focus groups obtained in Voorschoten regarding cycling to high school by teenagers. As mentioned in Chapter 5, due to logistical constraints, information was gained solely from two groups.

7.1 Background information about the school and students in focus groups

The nine students in these focus groups all attended the British School In the Netherlands. This school was an independent, coeducational, international school and followed the British curriculum. All teaching at the school was done in English; however, students came from over 80 different countries. It was situated in Voorschoten adjacent to a cycle path of 9km length connecting Leidschendam to Voorborg (see Appendix O). A cycle trail of 4km length also connected Voorschoten to the neighbouring towns of Wassenaar and Leidschendam (see Appendix P). Many other cycle paths existed in the vicinity of the school (see Appendix Q). All junior students at the school were required to wear a uniform and had the option of wearing tracksuit bottoms and shorts. Girls also had the option of wearing a sports skirt. Senior students were permitted to wear casual clothing.

Two focus groups were held, one included five year 9 students (3 girls and 2 boys) and the other six year 13 students (3 girls and 3 boys). Six of the nine students were born in the UK, one in Malaysia, one in Russia and one in the Netherlands. In addition to their country of birth, students had also lived in a variety of countries including Singapore, Oman and the US. Students had lived in the Netherlands for lengths of time ranging from five to 13 years. All the students, except one, cycled to school. Their cycle commutes ranged from 5 minutes to 25 minutes.

7.2 Results with respect to variables of the TPB and PWM

The results of the focus groups in Voorschoten are discussed in relation to gender, year group and SES, intrapersonal factors and behavioural setting, the four variables that, in accordance with the TPB and PWM, influence behavioural intentions and/or behavioural willingness – subjective norms, attitudes, image and perceived behavioural control.

7.2.1 Gender, year group and socio-economic status

Gender, year group and socio-economic status may influence students cycling to school in Voorschoten. Overall, the reasons girls gave for cycling to school were less because they enjoyed it and more because it was a social thing to do and due to habit, practicality and the freedom it gave them. Little difference in views towards cycling existed between year groups. No conclusions were able to be reached in relation to the effects of socio-economic status as this measure was not assessed.

7.2.2 Intrapersonal factors

Intrapersonal factors are discussed in relation to the four variables that, in accordance with the TPB and PWM, influence behavioural intentions and/or behavioural willingness – subjective norms, attitudes, image and perceived behavioural control.

7.2.1.1 Subjective norms

Injunctive norms

The influence of injunctive norms (what significant others think one ought to do) was evident in the students' responses to many of the questions. However, in question 8, 9 and 10 students were specifically asked to write down and discuss what their mothers/female caregivers, fathers/male caregivers and friends would say if they said: "*I thought I might bike to school.*"

Influence of parents

The parents of all students spoken to were born, and had lived, in countries other than the Netherlands. Consequently (as mentioned in section 5.4.1), as the Netherlands has the highest proportion of people cycling in the world (Ministry of Transport Public Works and Water Management, 2010), all parents grew up in countries where cycling was less common than it is in the Netherlands. However on moving to the Netherlands they were likely to be influenced by the local norms. When students were asked in questions 8 and 9 to imagine telling their mothers or fathers they might bike to school next year, most students said their parents would encourage them and a few said their fathers would be ambivalent. The influence of parents is consistent with research concluding students' travel behaviour continues to be influenced by parents through high school (Emond & Handy, 2012; Hunter & Youniss, 1982; Mitra & Buliung, 2015).

Influence of friends

In addition to the influence of parents, friends can also influence whether or not students cycle to school. Both year 9 and year 13 students said if they told their friends they were going to cycle to school next year, their friends would ask about cycling with them and none of their friends would say anything negative. These comments emphasised the

social nature of cycling for these students and many of them talked about meeting up and cycling with friends. This is consistent with research by Pooley, Turnbull and Adams (2005) and Manning and Allen (1987) who concluded students favoured their friends sticking to forms of transport where they could socialise with them.

Descriptive Norm

Influence of parents

As mentioned above in section 6.7.1.1, what parents do (descriptive norms) can influence the behaviour of their children. Like their children, the travel behaviour of parents can also to some degree be influenced by the behaviour of their friends and other people in their community. The cycling habits of the parents of the students in focus groups varied greatly with some cycling once or twice a week to work, but some cycling infrequently as it was too far or they didn't cycle in bad weather. Some worked at home but sometimes cycled on Friday nights for drinks with friends, and a girl who didn't really like cycling much said both her parents cycled. Given that all the students in the focus groups cycled to school, and despite variation in the cycling behaviour of parents, for these groups it was not evident that there was a clear link between the children's travel behaviour and their parents' behaviour. This is consistent with survey results from Christchurch where it was concluded descriptive norm in relation to parents did not have a significant effect on whether their children cycled to school.

Influence of friends

As also discussed in section 6.7.1.1, what friends do (descriptive norms), can also influence the behaviour of students. For students in Voorschoten, cycling was often favoured as it provided an opportunity to socialise with friends. Therefore if friends cycled to school, students were more likely to cycle. A year 9 student said he cycled to school because it was more sociable and more fun than going by car or train. He said if

none of his friends were cycling on a particular day he wouldn't cycle and would be lonely. Several students said they cycled more slowly when with friends, but were happy to sacrifice speed for the social benefits. A year 9 girl also said cycling to school was “*a good opportunity to discuss random topics with... friends.*” When giving the reasons why they cycled to school (Q17), two year 13 girls ranked “*I enjoy it*” well down their list of reasons, with habit and practicality being their primary reasons. These students both lived fairly close to school and said they cycled slowly together on separated cycle paths so they could talk to each other. These comments raise the question of the influence of habit in relation to cycle use. Research by Donald et al. (2014) on the influence of habit and intention with respect to car use and the use of public transport could be extended to include this. Stages contained in the transtheoretical model may also be relevant. This is supported by Forward (2014) who found that people at the fifth stage of the transtheoretical model (i.e. the maintenance stage) cycled without reflecting. Therefore, for students in Voorschoten, cycling may be automatic.

Students acknowledged the existence of cycle paths facilitated slow cycling and social interactions whilst cycling. Students also said they enjoyed listening to music on their bikes, which was more relaxing on separated cycle paths. Students didn't favour on-road cycling as they would have to bike behind each other, cycle faster and be much more aware of other vehicles and their safety. The sociability of cycle paths is not something widely discussed in the literature and is an area where further research could be carried out, particularly due to the positive health benefits through the act of socialising as recognised by Holt-Lunstad et al. (2010).

The relevance of descriptive norms was also evident when students were asked to circle words to describe the people shown in figure 1 of the focus group questions (see Table 2). A year 9 boy said the people in the photo didn't care what people thought of them. He then explained:

Cause maybe some people, like people not like in Holland or in some other place like the UK...it's not very common to cycle there...so they just don't care about it, and they just do it anyway.

This student was implying that if something wasn't very common, people didn't do it – reinforcing the role of descriptive norms in the decision-making in relation to cycling.

In summary, one of the main reasons students in Voorschoten cycled to school was for social reasons and as their friends also cycled. Students took longer routes or cycled more slowly to enable them to cycle with friends. The presence of cycle-paths facilitated this as they allowed students to ride side-by-side, with less safety concerns. Therefore, injunctive and descriptive norms both played a part in decisions by students to cycle to school.

7.2.1.2 Attitudes and Image

The attitudes of Voorschoten students to cycling and the effects of image on the students were assessed by comments made in focus groups on prototypes, clothing, hair, helmets, gender stereotypes and reasons for cycling.

Prototype evaluation – Picture sorting

As in Christchurch, students were given 24 images of people (see Appendix R) and asked to put them under the headings of car, bus, walk, cycle and motorcycle. By doing this, students evaluated images based on prototypes (i.e. a person believed to be a typical example for that category (Psychology Dictionary, 2014)). The students' placement of people under the five transport types and the reasons for their placement are given below:

Table 21: Student responses to question 12 regarding prototype evaluation.

Transport type	Comments by students in relation to images in Appendix R
Cars	Students thought young children, rich people, famous people, the policeman, older people and people in suits would use cars as their means of transport.
Buses	Similar to students in Christchurch, students generally put old people, young people, students and anyone they thought looked weird in the bus category. When questioned why two older people and no. 12 were put in the bus category, a year 9 student said “ <i>maybe she doesn't have a driving licence</i> ”. The man shown in no. 8 wearing a chef’s apron was described by students as someone who maybe worked in a pub and that “ <i>maybe it's just easy for him to cycle or maybe he can't afford a car.</i> ” Students also said they put the woman in picture 10 in the bus category because she looked Dutch. All these comments reflected elements of the realities of living in the Netherlands, where the proportion of people who use public transport, walk and cycle is high, and the cost of owning a car is also high when compared to New Zealand (Ministry of Transport Public Works and Water Management, 2010; Statistics New Zealand, 2014a).
Walking	Students thought sporty, young people and a few older men (no. 6 and 27) would walk as their means of transport.
Cycling	Students thought healthy people, a young boy and a man in his forties wearing a casual jersey (no. 20) would cycle as their means of transport. A student said of the man in picture 20: “ <i>He doesn't seem like the sort of guy who is going to go in a car.</i> ” Unfortunately the student didn’t explain why he thought this. The reason may have been that the man in picture 20 was not a child, rich, famous, a policeman, old or in a suit, as were the people the students placed in cars.
Motorbike	Students put a young woman, a policeman, people who looked aggressive and cool, attractive people as motorbike riders. A year 9 girl thought people road motorbikes because they “ <i>like to show off</i> ” and they think it is cool. When questioned whether she thought motorbike riding was cool, she replied, she thought it was.

Prototype evaluation - Word association

Students were asked to circle the four words they thought best described the people in Table 22, Table 23, Table 24 and Table 25 and made the following comments:

Table 22: Words used to describe girls on the bikes



	<p>Words or phrases used to describe the people in the figure:</p> <p>Independent, unattractive, feminine, care for the environment, self-confident, fit, considerate, smart, care for the environment, doesn't care what people think of them.</p>	<p>Words or phrases not used to describe the people in the figure:</p> <p>Popular, immature, cool or care about their safety</p>
--	---	---

Table 23: Words used to described the girl in the car

	<p>Words or phrases used to describe the person in the figure:</p> <p>Self-confident, popular, independent, cool, lazy, feminine, doesn't care about her safety</p>	<p>Words or phrases not used to describe the person in the figure:</p> <p>Smart, fit, immature, unattractive, considerate, dull or cares about the environment, doesn't care what people think of her.</p>
---	---	---

The girl in Table 23 was described by students as lazy because she wasn't getting any exercise. Students said she didn't care about her safety as she wasn't wearing a seat belt. Therefore overall students in Voorschoten were complementary about this girl and thought being a car driver was an attractive thing to be.

Table 24: Words used to describe the boy on the BMX bike



	<p>Words or phrases used to describe the person in the figure:</p> <p>Unattractive, immature, self-confident, independent, cool, fit, doesn't care about his safety, doesn't care what people think of him, cares about the environment.</p>	<p>Words or phrases not used to describe the person in the figure:</p> <p>Smart, popular, dull, considerate, lazy</p>
---	--	--

Table 25: Words used to describe the boy in the car

	<p>Words or phrases used to describe the person in the figure:</p> <p>Smart, self-confident, popular, independent, cool, considerate, fit and doesn't care what people think of him, lazy, dull, immature, and doesn't care about his safety.</p>	<p>Words or phrases not used to describe the person in the figure:</p> <p>Unattractive, doesn't care about the environment.</p>
---	---	--

A year 9 girl said the boy in Table 25 looked popular and said:

I mean you see all those films about kids in America having a car and they're like oh yeah do you want a ride.

Therefore, despite living in a country where the percentage of people cycling is high, students in Voorschoten made similar prototype evaluations to students in Christchurch with only a few differences in relation to people who bus and cycle.

Clothing and Hair

Clothing contributes to a person's image. Consequently, attitudes to clothing may affect whether students cycle to school. Year 13 girls indicated they had concerns in relation to their clothing and image while they were cycling to school. When discussing ways to overcome bad weather, one girl suggested she could wear waterproofs. However, she said she didn't wear them even if it was raining because she didn't like the look of them and instead preferred to wear her "*trackies*"¹⁷, without a rain jacket, although she sometimes wore "*Welllys*"¹⁸. Another year 13 girl also mentioned her aversion to wearing waterproofs and said that, she instead took a spare pair of jeans to school to change into. The effect of cycling on the appearance of a students' hair was mentioned by a year 9 girl in Voorschoten who said she wouldn't want to cycle when it rained because it would ruin her hair. Therefore, these girls had concerns about their image when on their bikes and were prepared to give priority to their appearance over their comfort. These views were consistent with those of Manning and Allen (1987) and Youniss and Haynie (1992) regarding social pressures on girls in terms of dress and conformity. Girls in Voorschoten used Dutch-style women's step-through bikes without a cross bar, which were more conducive to cycling in skirts or dresses. However, students did not mention bike styles or skirts or dresses in focus groups.

The wearing of special clothing for cycling was discussed by year 13 students in Voorschoten when they were asked whether they saw themselves as cyclists:

Boy: Not really. To me someone who is a cyclist wears tight shorts and...

¹⁷ The word "*trackies*" refers to track suit pants, often worn for sporting activities.

¹⁸ "*Welllys*" are waterproof rubber boots, also known in the UK as Wellington boots and in NZ as gumboots.

Girl: Lycra?

Boy: Yeah and doesn't...just shouts at you to move out of the way.

Interviewer: So kind of serious...

The students' comments indicated they did not see themselves as fitting the image of a cyclist (i.e. someone wearing Lycra and being very serious about cycling). When discussing the wearing of high visibility clothing, a year 13 boy said the girls in figure 1 of question 12 looked unattractive *"because they're all wearing the same retro reflective vests and stuff and a bit dull, seems very ... um structured. I think it might be a lesson."* As the students in the figure were wearing helmets and fluorescent vests, students in Voorschoten didn't think the photo was taken in the Netherlands but instead probably somewhere like the United Kingdom. Another year 13 boy said you generally don't see people wearing high visibility vests in Holland and that he didn't really think it was necessary during the day – thereby indicating vests might be useful at night when it was harder to see cyclists. His use of the word *"retro"* also indicated he thought high visibility vests were not cool. Therefore overall Lycra and high visibility vests (commonly worn by cyclists in some countries) were seen by students in Voorschoten as unattractive and uncool.

Helmets

In the Netherlands, the wearing of helmets is voluntary and students in focus groups in Voorschoten did not wear helmets to school. One year nine girl said people in Holland didn't like wearing helmets and in some ways it was less safe to wear a helmet in Holland because Dutch kids picked on the kids who did.

Boy 1: They throw stuff at you to see if the helmet works.

Interviewer: Is that why it is less safe?

Boy 2: I know people who have been like pushed off their bikes and have their bikes thrown into canals by Dutch kids.

Girl 1: Cause they're wearing school uniforms.

Interviewer: So it wasn't necessarily about helmets, it was because they were wearing...

Boy 2: and helmets.

The wearing of helmets therefore identified students from the British school as different to other children in Voorschoten and lead to a degree of bullying and intimidation. Consequently foreign students in Voorschoten avoided wearing helmets partly to avoid being picked on. Evidence that students thought helmets were uncool was apparent in comments by a year 9 girl in Voorschoten who said the girls in Table 22, didn't care what people thought of them because in Holland, no one really wears helmets. Therefore, in Voorschoten safety concerns as discussed by Mullan (2014) don't apply and descriptive norms inhibit the wearing of helmets.

Gender stereotypes

Gender stereotypes in relation to bike riding were not generally mentioned by students in Voorschoten. This finding is consistent with findings of Pucher and Buehler (2008) that in the Netherlands where cycling rates are high, the percentage of women cycling is higher than for men, and in such situations, it is not likely gender stereotypes would exist.

Reasons for cycling

When discussing their reasons for cycling, Year 9 students were asked in question 17 to rank their reasons in relation to enjoyment, habit, fits with how I see myself and

practicality. Year 13 students were asked to rank their reasons in relation to enjoyment, habit, fits with how I see myself, practicality, freedom, health benefits and the environment. Based on these limited options, three of the year 9 students (two girls and one boy) ranked “*I enjoy it*” as their second reason (out of four items), while one boy ranked it as his 4th reason. In the year 13 group, two girls ranked “*I enjoy it*” as fifth and sixth (out of seven items), two boys ranked it as their 2nd reason and one ranked it as his fourth or more reason– (he only gave his top three reasons). The top three reasons the two girls gave for cycling to school were habit, practicality and freedom. Therefore, half the students in the focus groups were not particularly keen cyclists but, despite this they all cycled to school. This again reinforces the potential link between habit and cycling and the applicability of the transtheoretical model (as mentioned above in section 7.2.1.2 in relation descriptive norms and friends) and is worthy of further investigation.

7.2.1.3 Perceived Behavioural Control

Factors outside a student’s control include elements of efficacy (confidence and capability) and controllability. All students in Voorschoten cycled to school and none mentioned any concerns regarding their lack of ability to cycle, a lack of confidence cycling to school or a lack of knowledge of road rules. This was probably due to the high frequency of their cycle use and as they mostly cycled on a network of separated cycle paths. Therefore, traffic safety was not a barrier to cycling.

7.2.3 Behaviour Settings

Bike ownership and equipment

All students in Voorschoten owned bikes. Students did not mention lack of a bike, lack of a nice bike, or lack of other equipment as reasons for not cycling to school. Lack of a helmet was not relevant in Voorschoten due to the lack of a law requiring this. The

maintenance of bicycles was a continuing issue for students in Voorschoten due to their reliance on bikes as their main means of transportation.

Safety

Personal security in relation to cycling to school was only mentioned in relation to cycling at night by year 13 girls. Both girls and boys cycled at night, but one girl said it depended on who she was with and where she was. She also said she would not cycle by herself at night and implied boys were more likely to cycle at night than girls, as evident in this exchange:

Boy 1: Yeah I think my favourite time to cycle is during the night.

Girl 1: You're a guy not a girl.

Boy 1: Even if it was raining.

Boy 2: Holland's pretty safe at night compared to other places.

Girl 1: Yeah but I wouldn't cycle by myself at night.

Girl 2: I wouldn't cycle if it was like 11 and it was dark. If I was with someone else, then I wouldn't worry so much.

This difference indicated that similar to many other countries, personal security whilst cycling (as discussed in section 3.4.2) was more of an issue for young girls in the Netherlands than for boys.

Students did not mention any concerns about traffic safety in Voorschoten however one year 9 girl said if she cycled in England she would be concerned for her safety in traffic.

Too much to carry

The need to carry lots of gear or to carry large bulky items can affect students' ability to cycle. This was mentioned by year 9 and 13 students in relation to the subject of Food Technology (FT). A year 13 girl student said:

Sometimes we have lots of stuff to carry, like if we have food tech. We have ingredients in boxes and stuff and you can't take that on the bike.

A year 13 boy agreed:

Yeah, if you've got too much you tend to take the car...like with FT, getting the cakes and things home was always a bit tricky and the curry in those plastic containers would leak everywhere.

Students had however developed ways to cycle with loads. One year 9 boy whose family had a single, “unreliable” car, said he usually hung bags off his handlebars and put things of equal weight on both sides so it was still easy to cycle. Panniers, bungee cords and trailers were also mentioned, however, trailers were only mentioned in a joking way.

Media influence

As discussed in section 3.4.7, the media influences people from a very early age (Stokes & Hallett, 1992). Similar to females in focus groups in Christchurch (as discussed in section 6.7.2) a year 9 girl in Voorschoten also made comments demonstrating the influence of the media on transport choices as she described the boy in Figure 20 (below) as popular and when asked why she said in a slightly envious way:

I mean you see all those films about kids in America having a car and they're like oh yeah do you want a ride...And they're like popular because they can do whatever they want, go wherever they want.



Figure 20: Boy in car

Consistent with conclusions of (Behm-Morawitz & Mastro, 2008), these comments indicated views towards car use were influenced by movies. The influence of American culture was also evident in another comment by the same girl as she reflected on a boy she knew at her school who had a car: *“America is just full of rich spoilt people”*. She also thought the girl in Figure 21 (below) looked like she was American and described her as popular *“as she has her own car and people might like that”*.



Figure 21: Girl in car

While comment about the influence of the media and American culture was only made by one girl in Voorschoten, other students agreed with her views. Despite this influence, however, the proportion of students that cycle to school in Voorschoten is far greater than the proportion in Christchurch and other factors must play a part. (Further comparison of

students in Voorschoten and Christchurch is made in Chapter 8). Further research on the influence of the media would be necessary to explore the link between the media and students' views on how to travel to school.

Chapter 8: Key findings, recommendations, further research and limitations

8.1 Introduction

The overall aim of this thesis was to work out why more teenagers do not cycle to school in Christchurch, New Zealand. To achieve this aim, the objectives were to determine:

1. The nature of cycling to school by teenagers in Christchurch.
2. The predictive validity of the TPB and the PWM with respect to students' decisions to cycle to school.
3. Which variables of the TPB and PWM have the greatest influence over teenagers' decisions regarding cycling to school?
4. The influence of intrapersonal factors and behaviour settings (as contained in the ecological model of active transport) on cycling to school for teenagers.
5. Whether teenagers who have grown up in places where few teenagers cycle to school (such as the UK) are influenced by different factors when they move to places like the Netherlands where almost everyone cycles to school.

In the previous chapters I have presented the background literature, methods, results and some discussion of my research to answer each of these questions. Here I provide further discussion of these findings, together with recommendations of ways to increase the percentage of students cycling to high school in Christchurch. Limitations of the research and avenues for further research are also suggested.

8.2 The nature of cycling to school by teenagers in Christchurch

The research provided information on how teenagers got to school in Christchurch. Results showed 19% of all students cycled to school. The mean distance students travelled to school was 4.29km. The average distance travelled by car was 2.38km and by bicycle 2.56km. Therefore the average distance travelled by car was less than the average distance travelled

by bicycle. Further research on perceptions of distance would be a useful way to address students' ideas about how far is too far to cycle.

The survey also found year 9 students cycled to school more than year 13 students (27.3% and 9.9% respectively); boys cycled to school much more than girls (28.7% and 3.3% respectively); and students from low decile schools cycled to school less than students from high decile schools (average of 3.65% and 27.16% respectively). Chi-squared tests showed these differences to be significant. Age did not have a great influence on girls as the percentage of girls cycling to school remained low (0-5%) across all age groups. Students from low decile schools were least likely to have ever cycled to school.

The higher proportion of students cycling at high decile schools is partially consistent with findings of Rice (2008) that relatively high rates of walking and cycling in Christchurch occurred in places of both high and low socio-economic status. Contrary to this, in the US, Davison et al. (2008) found low rates of active commuting occurred in places of high socio-economic status. It is difficult to assess the consistency of the findings of Davison et al. (2008) with this research as their research did not differentiate between walking and cycling. Differences in year groups is consistent with research by Horspool (2006) who found cycling rates differed for different age groups. Differences in gender are consistent with conclusions of Garrard et al. (2006) and Steinbach et al. (2011) regarding cycling by women in Melbourne and London, respectively, and Manning and Allen (1987) and Youniss and Haynie (1992) with respect to the greater pressures on girls (than boys) in terms of dress, conformity and social involvement. Any programmes to increase the percentage of high school students cycling to school would need to target girls, younger students and those from lower socio-economic areas.

8.3 The predictive validity of the TPB and PWM

In order to achieve my second objective, hierarchical regression analysis of the Christchurch survey data demonstrated prototype evaluation and prototype similarity, willingness and descriptive norm from the PWM did little to enhance the predictive validity of the TPB. This may be because the variables of the TPB are more relevant in relation to cycling to school than the additional variables of the PWM. It may also be because the TPB is based on

reasoned decision-making where intention influences behaviour. In contrast, in the PWM, risk images and behavioural willingness contribute to behaviour via a pathway that is more socially-reactive than reasoned. Therefore, in relation to cycling, decisions may be made after reasoned decision-making related to attitudes, subjective norms and perceived behavioural control rather than socially-reactive decision-making related to risk images and behavioural willingness. That is, decisions may be based on variables of the TPB, rather than the PWM. So for example, students will be more influenced by their perception of how safe it is to cycle, whether their friends think they should cycle, and how confident they are cycling on busy roads, rather than their unconscious views about the status of cyclists. This is contrary to conclusions of De Bruijn et al. (2005) who found for adolescents, bicycle use may not always be planned and reasoned. In view of these conclusions, when predicting intention to cycle to school, it is preferable to use the TPB rather than the PWM and any future research on cycling to school by adolescents should use the TPB as a framework in preference to the PWM.

8.4 Which variables of the TPB and PWM that have the greatest influence over intention and behaviour?

To achieve the third objective of this thesis and determine which variables of the TPB and PWM have the greatest influence over teenagers' decisions regarding cycling to school, it was first necessary to determine the correlations between the 13 variables of the two behaviour change theories. Correlational results demonstrated all variables were correlated with the intention to cycle to school with the exception of prototype evaluations (both positive and negative). Therefore, all variables (with the exception of prototype evaluations) influenced the intention to cycle to school. Results also showed past behaviour and intention were highly correlated and therefore it was not appropriate to consider past behaviour as a variable due to the inability for it to be considered independently.

Following correlational analysis, hierarchical regression analysis enabled me to determine which variables of the TPB and PWM had the greatest influence over intention to cycle to school. The analysis showed perceived social pressure by friends (injunctive norm-friends) had the greatest influence over students' intention. This was closely followed by perceived social pressure by parents (injunctive norm-parents) and subsequently, attitudes of students.

In terms of injunctive norms, to increase cycling rates to school it would be advantageous for attitudes and norms associated with cycling to change in favour of cycling. Similar conclusions were reached by Gatersleben and Haddad (2010) in their research in England looking at the “typical cyclist” where they suggested cycling rates could be increased through the promotion of cycling as a day-to-day activity and the use of images of cycle use by normal people, for normal day-to-day activities. These conclusions are also consistent with those of Underwood et al. (2014) who found teenagers did not continue cycling if they were discouraged by social norms. Ways to achieve changes in norms and cultural change are discussed in Section 8.5. The importance of perceived behavioural control, as discussed in focus groups, indicates programmes to enhance students’ cycling confidence and ability to maintain their bicycles would also be beneficial.

The Christchurch study also showed willingness to cycle and whether other friends cycled (descriptive norm) affected the intention of adolescents to cycle to school, but to a lesser degree than perceived social pressure to act in a certain way (injunctive norm) or perceived behavioural control. The finding in relation to descriptive norm was perhaps to be expected given this research found only 19% of teenagers cycled in Christchurch. Students’ willingness to cycle and the influence of descriptive norm (friends) could be changed by changing norms and attitudes to cycling through methods as will be discussed further in Section 8.5 below. Contrary to findings of Tal and Handy (2008) and Wen et al. (2008), survey results also show increasing student cycling through encouraging more parents to cycle is likely to be less effective than encouraging more adolescents to cycle.

8.5 The influence of intrapersonal factors and behavioural settings in Christchurch

The results of the survey and qualitative analysis of focus groups and staff interviews enabled the fourth objective of this thesis to be achieved – that is, to determine the influence of intrapersonal factors and behaviour setting (as contained in the ecological model of active transport) on cycling to school for teenagers.

8.5.1 *Intrapersonal factors*

8.5.1.1 *Age*

When combined with gender and decile, year group (as a proxy for age), was not identified in the regression analysis as being a significant factor affecting the intention to cycle. However, chi-squared tests on the percentages of students cycling for each year group showed statistically significant differences between year groups $\chi^2 (2, N = 331) = 16.75$ $p < .001$. Discussion in focus groups showed attitudes and norms in relation to cycling varied according to age, however the survey showed the percentage of girls cycling to school remained very low (0-5%) across all age groups and these results may have affected the findings of the regression analysis in relation to the importance of year group. Probably due to the lower rates of cycling for year 11 and 13 students, these year groups also gave more reasons for not cycling to school than year 9 students. Differences between year groups were also evident in focus group discussions. These differences are discussed below in terms of subjective norms, attitudes and perceived behavioural control. Approximately 17% of students over 16 years of age also have a vehicle licence and therefore may have the option of driving a vehicle to school. This option would also reduce the percentage of older students cycling to school.

8.5.1.2 *Gender*

Gender was identified in step 1 of the regression analysis as being a significant factor affecting the intention to cycle (note this step only included gender, year and decile group). Survey results also showed a far greater percentage of boys cycled to school in Christchurch (29%) compared to girls (3%) and this difference was statistically significant. These results are generally consistent with the trend found in the NZ Household Travel Survey by the Ministry of Transport (2013a) which concluded that, nationally, 3% of girls (13-17 years) cycled in the last month compared to 9% of boys of the same age. Results are also consistent with the NZ Census where nationally in 2013, 5.9% of males aged 15-19 years-old cycled to work, compared to 2% of females (Statistics New Zealand, 2014a). The discrepancy between the cycling rates for males as shown in the NZ Household Travel Survey (9%), the New Zealand Census (5.9%) and the results of this research (29%) may in part be explained by higher rates of cycling in Canterbury (9.3%) compared to NZ as a whole. Results may also

have been skewed as 39% of surveys were completed at a boys' school (Christchurch Boys' High School) where the percentage of boys cycling to school was 47.3%. These high rates indicate the influence of factors other than gender, such as norms or school facilities.

Gender differences in views towards cycling were also evident in other results. Probably due to the lower rates of cycling for girls, girls also gave more reasons for not cycling to school than boys. Gender stereotypes were also discussed in focus groups, with several girls saying cycling was something done by boys. These results are consistent with conclusions of Pucher and Buehler (2008) where in countries with low cycling rates, such as New Zealand, the proportion of males that cycle is greater than females. Reasons for these differences are discussed below in terms of subjective norms, attitudes and perceived behavioural control.

8.5.1.3 Socio-economic status (decile)

School decile was identified in step 1 of the regression analysis as being a significant factor affecting the intention to cycle. The school with the highest percentage of cyclists was Christchurch Boys' High School (CBHS) with 47.3% and a decile rating of 9, followed by Christchurch Girls' High School (CGHS - 22.2%), Cashmere High School (CHS - 12%) and Riccarton High School (RHS- 11.9%)¹⁹. The decile ratings for these schools were 9, 8 and 7 respectively. Schools with the lowest percentage of cyclists were Aranui High School (3.1% - decile 2), Linwood College (4.2% - decile 2), and Hillmorton High School (4.7% - decile 5). The figures for the single sex schools (CBHS and CGHS) are likely to be affected by gender, and therefore it is difficult to draw conclusions about decile and cycling rates using these schools alone. Despite this, the high cycling rate at CBHS and CGHS, and relatively high figures at CHS and RHS, indicate cycling is more popular in areas of higher socio-economic status. Similarly, low cycling rates at low decile schools suggest cycling is less prevalent in areas of lower socio-economic status. Further conclusions regarding the status of cycling are made under Section 8.5.1.5 below. In focus groups students at both high and low decile schools suggested cycling was a low status form of transport. Given, however, a greater percentage of students at high decile schools cycled, compared to low decile schools, it is likely the low status of cycling is a greater influence at low decile schools than at high decile

¹⁹ The cycling rate for Christchurch Girls' High School (CGHS) was 22.2%, but due to a sample size of 9, should be treated cautiously.

schools. These findings are consistent with those of Steinbach et al. (2011) that cyclists in London were more likely to be affluent and, for non-White professionals, cycling was often seen as a low status form of transport. It is difficult however to make any firm conclusions regarding the relationship between socio-economic status and cycle use due to the difficulties in disentangling SES and other social considerations such as culture, ethnicity, race and class (Betancourt & Lopez, 1993; Carlin et al., 1997; Matthews, 1992).

8.5.1.4 Subjective norms

Results showed subjective norms, including both injunctive and descriptive norms influenced cycling to school by teenagers. Hierarchical regression showed injunctive norms to have the greatest influence over students' intention to cycle to school and descriptive norm to have less influence. In contrast, focus groups showed both injunctive and descriptive norms to have influence. With respect to injunctive norms, and consistent with findings of Hunter and Youniss (1982) and Mitra and Buliung (2015), focus groups showed parents were more likely to encourage their children to cycle than friends were, and fathers were generally slightly more encouraging than mothers. Both mothers and fathers were concerned for the safety of their children and wanted their children to get more exercise for health reasons. Views of both friends and parents were also shown to discourage students from cycling. Therefore, although parents encouraged their children to cycle, their friends generally did not. Other researchers such as Williams, Pocock and Bridge (2009) concluded that mothers in suburban Australia are key to the mobility of children. Further research would be necessary to examine the influence of descriptive versus injunctive norms in greater detail and whether it may be appropriate to use different behavioural change programmes for fathers and mothers. Due to the significance of injunctive norms, in relation to both parents and friends, any programmes to increase rates of student cycling, should take this into consideration.

Differences also existed between younger (year 9) students and older (year 13) students. Year 9 students were more likely to say their friends would encourage them to cycle than year 13 students, and conversely year 13 students were more likely to discourage their friends from cycling than year 9 students. This is consistent with the findings of Horspool (2006). Most students also said it would be embarrassing to cycle to school, due to the need to wear a helmet, the non-social nature of cycling, and the social vulnerability of being by themselves.

More year 9 than year 13 students however considered cycling *could* be a social thing to do. However, few girls cycled to school at any age. Walking and driving in cars with friends was seen as social by both age groups and cycling was not considered to be as embarrassing at schools such as CBHS where the percentage of students cycling to school was highest at 47.3%. The implication of these findings is that if cycling rates decrease through the teenage years, and people are not in the habit of cycling, there is less chance that a particular cohort will cycle as adults (M. Johansson, 2005). This has consequent disadvantages in terms of health, traffic congestion, air pollution and climate change as discussed in Chapter 1. The suggested means to change this trend is, consistent with Garrard et al. (2006) and Sallis et al. (2006), for attitudes and norms associated with cycling to change in favour of cycling though changes at multiple levels, targeting individuals, social environments, physical environments, and policies.

Embarrassment is often associated with wearing cycle helmets. This could be avoided by changing New Zealand law so wearing helmets is optional. Although there has been some demand to make cycle helmets optional in NZ, the campaign to require helmets to be worn has been so successful (Fagan, 2014; Mullan, 2014) that such a move could be very unpopular with a proportion of the NZ population and therefore politicians may not support a law change if there is a possibility they may lose votes. A possible scenario is that, as has happened in Vancouver, through increased provision of off-road cycle paths and greater numbers of people cycling without helmets, the NZ Police may conclude their enforcement of the helmet law is nonsensical (Bruntlett & Bruntlett, 2014) and the helmet law may become redundant. This would have the greatest effect on girls of high school age who experience greater pressure in terms of dress (Manning and Allen, 1987; Youniss and Haynie, 1992) and their looks (Simmons and Blythe, 1987), than boys. The embarrassment of wearing helmets could also be avoided by the creation of new types of helmets. Examples of these are the inflatable helmets created by Swedish company Hövding (2015) or the increased popularity of new chic designs that look more like regular hats (Cyclechic Ltd, 2015). Cost, however, is likely to be an impediment as such helmets are generally more expensive than standard helmets. This option was not considered by students, but would be worthy of further research. Further investigation of the influence of different styles of bicycles on student cycling rates may also be worthwhile, particularly in relation to the greater proliferation of Dutch-style bicycles which are more comfortable, practical and fashionable for girls.

Culture, ethnicity and race may also influence decisions by teenagers regarding cycling to school. In some European countries, ethnic differences with respect to cycling have been recognised, with programmes implemented to target new migrants (Van der Kloof, 2015). Further research would be required to understand the link between cycling and ethnicity, culture and race in New Zealand and investigate whether there would be benefits in the implementation of any similar programmes.

8.5.1.5 Attitudes and image

Attitudes to cycling and the image of cycling may affect whether teenagers cycle to school. The results of the hierarchical regression showed attitude to be a significant predictor of intention to cycle to school but not prototype evaluation (image). Focus groups did, however, show image to be important to adolescents, in particular year 13 girls. The differences in the findings of the hierarchical regression and the focus groups may have been due to the predominance of boys in the study sample, and year 9 boys in particular. The findings of the focus groups are consistent with the findings of Manning and Allen (1987) and Youniss and Haynie (1992) who concluded adolescent girls experience greater pressure in terms of dress, conformity and social involvement than boys. The implication of this is that to be effective, programmes aimed to increase cycling rates for teenagers need to be gender specific. This conclusion is supported by Dickinson, Kingham, Copsey and Hougie (2003) who found different approaches to increase cycling rates were required for organisations employing large percentages of women.

Some attitudes towards cycling were however common to both boys and girls. In general, students thought special clothes were required for cycling and didn't like helmets, high-vis jackets or Lycra. Cycling was seen as something that made you sweat and as primarily being something for fit, young, healthy people, and boys. Consistent with findings of Steinbach et al. (2011) cycling was also viewed by some students as having low status and as a 'sad' thing to do, and, unlike car drivers, cyclists were not described as 'popular'. Contrary to the findings of the survey, focus groups showed teenagers' decisions to cycle to school were sometimes based on social reactive or heuristic decision-making as students emphatically said things such as "*It's not my thing – just don't*" and "*I hate biking*". The introduction of new bike styles and helmets would change prototype evaluations (image) associated with

cycling. Changes at multiple levels would also be necessary to change attitudes in favour of cycling.

8.5.1.6 Perceived behavioural control

Decisions about whether or not to cycle to school can be affected by factors including matters of efficacy and controllability. The vast majority of students in Christchurch were able to ride a bicycle however from the focus groups it was evident that some students, in particular year 13 girls, lacked confidence with respect to cycling on roads. This lack of confidence could be addressed through cycle skills education programmes such as the Cycle Safe Programme offered to Christchurch primary schools by the Christchurch City Council. Some of the students spoken to in focus groups had participated in this programme, however, the lack of cycling confidence indicates there would be benefits if the programme was also implemented at high school level.

Almost all students in Christchurch could cycle, however not all had ever cycled to school and therefore lacked this experience. A question in the survey asked students if they had ever cycled to school at any school (section 1, question 10). Answers to this question showed 45.3% had cycled to school at some stage. In comparison, only 19.3% of all students *currently* cycled to school. This difference could be to do with students' desire to cycle decreasing as they age (particularly for girls) or with a trend towards lower rates of cycle use (evident in the percentage of year 13 students that had ever cycled being higher than for the other year groups). Further research could be undertaken to investigate the link between previous and existing cycling to school. Percentages of how many students had ever cycled to school do however indicate that at least 45.3% of students had owned or borrowed a bike and used it to cycle to school at least once in the past.

8.5.2 Behaviour setting

The behaviour setting or physical environment also influences whether students cycle to school. This includes matters such as distance, safety, having too much to carry, lack of equipment, uniform requirements, facilities at school, how permissive schools are regarding

bringing cars to school and the media. This is consistent with research by De Bruijn et al.(2005) who concluded the cultural and social environment as described in the TTI, is directly associated with cycle use for adolescents.

8.5.2.1 Distance

Distance to school was recognised as a factor influencing the likelihood of cycling to school. As a result, it was controlled for when analysing the results of the survey by only selecting those respondents who lived more than 1km or less than 4km from school. Distance was also discussed in focus groups, with some students saying they lived too far or too close to cycle to school. The results of the survey showed the average distance travelled by car (2.4km) was less than the average distance travelled by bicycle (2.6km), creating an opportunity to replace some car journeys with cycle journeys. Therefore these results suggest that although “too far to cycle” is often given by students as a reason for not cycling, other reasons may be more applicable, or as some would say, “too far to cycle” is seen by some as a socially acceptable ‘excuse’. Furthermore, as the average distance travelled by boys and girls was similar, 2.22km and 2.16km, respectively, but more girls than boys gave “too far to cycle” as a reason for not cycling to school, and as the percentage of students who thought it was too far to cycle, increased from year 9 to year 13 students (despite the distance these students travelled to school also being similar) these results also suggest reasons other than “too far to cycle” may be more applicable. Changes to norms and attitudes regarding cycling to school would increase the likelihood of students changing their perceptions about acceptable distances to cycle. Further research on perceptions of distance by students, and how far is too close or too far to cycle would also be beneficial.

8.5.2.2 Safety

Fears for personal security can be a reason for not cycling to school. In the survey, no students mentioned a concern for personal security, however, it was mentioned in focus groups at Aranui High School. The personal security of children was also mentioned by teachers at Hillmorton High School in relation to the transport options chosen for their

children by parents of refugees. The issue of personal security is difficult to address. Cycling with others would improve personal security and if more students cycled, this would increase the likelihood of students being able to cycle with others.

Fears for traffic safety are also relevant to cycling to school (Centers for Disease Control and Prevention, 2002; Pikora et al., 2003; Thornton et al., 2010; Villanueva et al., 2012). In the survey 15.4% of students said they thought cycling was too dangerous or that they didn't cycle because they didn't like the traffic (section 1, question 11). Fear of traffic was also discussed by many students in focus groups as a reason for not cycling. This is consistent with research by Centers for Disease Control and Prevention (2002) in the US and Villanueva et al. (2012) in Australia. Many attempts have been made around the world to address the issue of traffic safety in relation to cycling. Measures used include the provision of separated cycle infrastructure (Kingham et al., 2011), cycle awareness campaigns (e.g. "See the person, share the road") (New Zealand Transport Agency) and campaigns designed to encourage cyclists to increase the likelihood they will be seen by motorists (e.g. "Be bright be seen") (New Zealand Transport Agency, 2015a). It is often difficult or not possible to measure the benefits of individual schemes, as multiple approaches to behaviour change are frequently used at the same time. It is likely, however, that measures to increase traffic safety, as discussed, could reduce traffic fears, encourage more students to cycle, and would therefore be a useful part of a multi-faceted approach to increase cycling rates for high school students in Christchurch.

8.5.2.3 Equipment

A lack of equipment such as a bike, bike lock or helmet can influence decisions to cycle to school. In the survey, 16% of students said a reason they didn't cycle was because they didn't have a bike or a "nice bike". The lack of a bike or a "nice bike" was not often mentioned by students in focus groups. They did however mention a lack of equipment such as a bike lock, a bike helmet, and high visibility clothing as reasons affecting whether or not they cycled to school. The provision of bikes and associated equipment is a financial constraint that affects students, and was particularly mentioned by students in focus groups from lower decile schools. Not-for-profit cooperatives or community organisations, such as RAD (Recycle a Dunger) Bikes in Christchurch, bridge the funding gap to a small extent by providing

workspaces, tool and bike parts, mechanical instructions to cyclists, a depot for bike and part donations and sometimes gift bikes to local charitable organisations. In Christchurch, ICE (Inner City East) Cycles enables people to gain the skills required to maintain bikes and occasionally offers free bike maintenance to customers. Similar organisations exist in other parts of the world, such as San Francisco, Vancouver (Harrison, Kjellander, Komolov, Loza, & Shah, 2012), Vienna, London, Melbourne, and are often known as ‘bike kitchens’. Similarly, bicycles and equipment are also sometimes supplied to groups in association with cycle skills and bike maintenance programmes. One such course was run by the State Government with Aboriginal men in Sydney to improve the health and wellbeing of particular groups. The results of this course saw a large increase in the rates of cycling participation (Bindon, Headley, Rissel, & Wade, 2009). Not-for-profit cooperatives or community organisations could encourage the participation of teenagers in their own time, or during school time, thus providing skills and in some situations equipment for participants. Teenagers could also be taught bike maintenance skills as part of the school curriculum. Schools could undertake this independently or in association with not-for-profit cooperatives or other organisations in their community.

8.5.2.4 Clothing

Clothing may deter students from cycling to school. Girls’ school uniforms, in particular short and/or tight skirts and long kilts, were mentioned by teachers as possible impediments to cycling. In addition, in the survey, two year 9 girls gave “*I wear a skirt*” as a reason for not cycling, and in focus groups two year 9 girls said their uniforms made it difficult to cycle. However, at Christchurch Girls’ and Hillmorton high schools, where girls did not have the option of wearing trousers, students did not mention any desire to wear trousers as part of a school uniform. Students also often had the view that special clothing was required to cycle and discussed the need to change their clothing if they biked to school. The promotion of cycling as a normal day-to-day activity would lessen the existing perception that special clothing is required for cycling (Gatersleben & Haddad, 2010; Smith et al., 2011). This is evidenced overseas in cities such as Copenhagen where the vast majority of people riding bikes do not wear special clothing. Changes to existing school uniforms and greater proliferation of City Bikes or Dutch Bikes could also make it easier for girls in Christchurch to cycle to school (Horspool, 2006; A. Williams & Bedward, 2002).

8.5.2.5 School facilities

Facilities provided at schools can affect decisions by students regarding cycling to school. Bike parking was provided at all schools and lockers at nearly all schools. Bike theft was common at most schools and was influenced by the location of bike stands, whether facilities were locked and whether surveillance cameras existed. Fear of bikes being stolen and or having problems with broken bikes were also issues for some students. These issues could be addressed if school boards chose to allocate funding to provide covered, secure cycle parking and lockers to store bike helmets. This is consistent with research by Wardman, Tight and Page (2007) who concluded the provision of good cycle parking at workplaces would increase cycling rates in the UK. It is also consistent with measures suggested by the UK Government in its travel plan resource pack for use in travel plans to increase cycling (Steer Davies Gleave and the Association for Commuter Transport, 2000) and research in the Netherlands where the risk of bicycle theft was recognised to be negatively correlated with bicycle use (Rietveld & Daniel, 2004). Therefore, in addition to action by school boards, the NZ Government, through the development and implementation of travel plan resource packs, and funding, could assist local councils and schools in introducing travel plans to increase student cycling rates.

8.5.2.6 Bringing cars to school

Schools were generally quite permissive of older students bringing cars to school, and this lack of limitation gave these students the option of driving to school when they otherwise might have cycled. The implications of this are that provided the price of cars, car insurance and fuel remains low in New Zealand, students will continue to bring cars to school. When schools do not permit students to park on school grounds, students instead park off-site, usually in nearby streets. The lack of on-site car park provision means schools have little control over parking (e.g. they cannot restrict parking or charge for parking) or whether students bring cars to school. In addition, the lack of on-site parking was not mentioned by students as a reason not to bring cars to school. The biggest change in NZ that could have affected the number of students driving to school was the increase to the minimum driving

age in 2011. Prior to 1 August 2011, students could have a restricted licence, and drive unsupervised at 15 and a half years of age. Following the change, students were unlikely to have a restricted licence until 16 and a half years-old. Teachers, however, did not think this change had made much of a difference to the number of students driving to school. Their reason for this view was that the cost of buying, running and maintaining a car was still the main limitation for students, and therefore it was still primarily older students who had the means to own cars. This is consistent with research by Davis et al. (2012) showing the costs of running cars has increased since 2004. Additionally, school students may be very sensitive to costs, as most students have limited incomes.

World trends show young people to be driving fewer kilometres. In the US, Davis et al. (2012) found reduced rates of driving among young people (16-34 year-olds) since 2004. However, focus groups with students and interviews with staff did not indicate this to be the case for high school students in Christchurch, and the driving of a car to school was still an activity many students seemed to aspire to. Further research would be required to verify whether international trends showing a decrease in the vehicle kilometres travelled by young people also apply in Christchurch. Such changes may occur through rising fuel costs, further economic downturn, greater environmental awareness, increased congestion, increased car parking costs and the substitution of communications technology for car use (Stokes, 2013). This research shows changes in attitudes and norms also play a part.

8.5.2.7 Media

Movies and actors in movies influence whether students cycle to school. Although cycling in movies was seen by some year 13 girls as 'hip', results showed students didn't translate this image to real life. Movies such as *Mean Girls* where an attractive teenage girl drives a late-model convertible appeared to influence the transport stereotypes of adolescent girls. This was consistent with findings of Behm-Morawitz and Mastro (2008) regarding the influence of movies on the gender-based attitudes and beliefs of emerging adults. The portrayal of cycling in the media is a reflection of the norms of society (Sallis et al., 2006) and conversely societal norms influence the media. Consequently, changes to societal attitudes and norms would be needed to change the portrayal of cycling in the media. The opposite however also applies i.e. media will be influenced by cultural change. On balance, however, the media has significant

influence of students in relation to their attitudes to cycling to school and therefore increases in the cycling rates of adolescents could be achieved through changes by the media in favour of cycling.

8.5.3 The combination of factors

A sense of being overwhelmed by the combination and cumulative nature of factors associated with cycling to school also discouraged students from cycling. A way to overcome this situation is to first identify the individual barriers – an approach followed by community-based social marketing. Behaviour change programmes to assist individuals to identify barriers and ways to overcome barriers could be a useful way to overcome the problem of students being overwhelmed by the number of perceived difficulties in cycling to school. An example of such a programme is that of community based social marketing (McKenzie-Mohr, 2011). Furthermore, programmes such as Australia's TravelSmart program (in South Australia, Victoria and Western Australia) have focussed on individuals and created personalised programmes to encourage people to travel more sustainably (Australian Government, 2005). These projects have been implemented in residential communities, businesses and schools. Although costly and time consuming, such programmes could be implemented by policy makers within New Zealand schools to assist students to change their travel behaviour, with potential flow on effects to other family members and future generations.

Various other programmes have also been established throughout the world to change the travel behaviour of children. Many of these have focussed on the safety of children in relation to the journey to school. The first such program occurred in Denmark in the 1970s in response to high child pedestrian accident rates (Appleyard, 2003). Safe Routes to School (SRTS) programmes now exist in many countries around the world including the US, Canada, UK and Australia. The aims of the various SRTS programmes vary slightly but generally involve increasing the number of children walking and cycling to school and addressing the safety of these children through education, advocacy and improving infrastructure (McDonald, 2007). The SRTS program in Victoria, Australia includes “education, engineering, encouragement and enforcement initiatives, aimed principally at reducing casualty crash frequency and severity for children as pedestrians, bicyclists and

passengers” (Delaney, Newstead, & Corben, 2004, p. iii). An evaluation of the effectiveness of the Victorian program in 2004 concluded there were benefits of the programme in terms of safety (Delaney et al., 2004). A review of literature was also undertaken on the effectiveness in the US of safe routes to school and other programmes to promote active transportation to school (Weigand, 2008). Conclusions of this review were that evaluations of results were sparse and it was difficult to identify which elements of programmes were effective in increasing the number of students who walk or bicycle to school. Programmes were also generally targeted at primary school-aged children; therefore it is difficult to gauge the applicability to teenagers.

At present, no similar nationwide programmes to achieve safe routes to school exist in NZ. Some individual local authorities have produced resources for schools on travel to school, assist schools with the development of travel plans, and run cycle safe programmes (e.g. Christchurch City Council, (2015)). The NZTA provides curriculum resources for schools, and has published guidelines and reports for schools. Research on overcoming barriers to cycling to school and improving school travel systems in NZ concluded cycling to school had many benefits, but more priority needed to be given to active transport, and greater leadership was required within the wider area of school transport (Mackie, 2010).

Subsequent to Mackie’s research, the NZTA has published guidelines for schools on safer journeys to school (New Zealand Transport Agency, 2014) but has not introduced a nationwide programme to encourage active transport or improve the safety for those walking and cycling to school, as has occurred in other countries as mentioned above. The implementation of such a programme in NZ would be beneficial. To be effective in relation to teenagers, such a programme would need to be tailored to their needs. That is, consistent with Manning and Allen (1987) and Youniss and Haynie (1992), it would need to recognise pressures on teenagers in terms of dress, conformity and social involvement, particularly for girls.

8.6 Comparing teenage cycling in locations with high and low cycling rates

The purpose of this part of the research was to achieve my fifth objective and determine whether the factors that influence cycling to school for teenagers differ for those who have

lived all their lives in a location with low cycling rates, compared to those who have grown up in a location with low rates of cycling and moved to a location with high rates of cycling. The two research locations were Christchurch, where cycling rates are low, and Voorschoten, where cycling rates are high. As a survey was not carried out in Voorschoten, results relate solely to focus groups. A comparison was made between students in Voorschoten and Christchurch in relation to intrapersonal factors including subjective norms, attitudes and perceived behavioural control, and behaviour setting. All analysis needs to be treated cautiously due to the very small sample size, particularly in Voorschoten.

8.6.1 Intrapersonal factors

8.6.1.1 Subjective norms

The influence of subjective norms (both descriptive and injunctive) in relation to both parents and friends was considered in both locations. The influence of descriptive and injunctive norms in regards to parents was not strong in Voorschoten. Similarly, the influence of descriptive norms for parents was not strong in Christchurch whereas the influence of injunctive norms for parents was strong. In Voorschoten, however, where all students cycled to school and in Christchurch where the majority of students didn't cycle to school, the influence of descriptive norms and injunctive norms in relation to friends was found to be important. The norm was, however, very different in each place. In Voorschoten descriptive norm for friends increased the likelihood students would cycle to school, whereas in Christchurch, it was decreased. An increase in the percentage of students cycling to school in Christchurch would change the influence of the descriptive norm and encourage more students to cycle to school. Similarities in the importance of descriptive norms in both locations were probably because pressure to conform peaks in mid-adolescence (Youniss & Haynie, 1992) and was relevant in both countries. The importance of descriptive norms is also associated with the desire by adolescents to be social. This was recognised in research by Pooley, Turnbull and Adams (2005) in the UK who concluded social needs in relation to travelling to school (particularly for girls) were more important for some teenagers than road safety. The desire to be social was also evident in Voorschoten, as most students cycled with their friends to school and therefore cycling was encouraged by their friends and was a positive social experience. In contrast, in Christchurch, cycling was not seen as a social thing

to do, with one student even describing it as “*anti-social*”. Students in Voorschoten also favoured cycling slowly with friends on cycle paths in preference to other types of travel. The sociability and safety of cycling was enhanced significantly in Voorschoten by the existence of separated cycle paths.

In Christchurch, consistent with Horspool (2006), the friends of younger students seemed more accepting of cycling than the friends of older students. In contrast, in Voorschoten, congruent with Grize et al. (2010), cycling was accepted regardless of age. Cycling was also considered to be embarrassing in Christchurch due to the need to wear a helmet; the stigma attached to cycling alone; and the social vulnerability of being alone. This was not the case in Voorschoten where cycling was very common and helmets were not worn.

8.6.1.2 Attitudes and image

In both locations, cyclists were considered most likely to be sporty, healthy and young, and similar transport stereotypes applied with respect to other modes of transport. In Voorschoten, however, possibly due to high cycling rates, students predicted some men of middle-age would also use a bike for transport. In addition, cycling was seen as an activity for both boys and girls, probably as a consequence of similar numbers of men and women cycling (Basset et al., 2008). Teenagers driving cars were described as popular in both countries and the influence of American movies on this attitude was also evident. However, in contrast to findings of Behm-Morawitz and Mastro (2008) regarding the adoption of attitudes, beliefs and behaviours shown in these movies, teenagers in Voorschoten were much less likely to drive cars to school than those in Christchurch. As students in Voorschoten seemed to have similar attitudes to cars as students in Christchurch, their low rates of driving to school appear to instead be due to the high use of bicycles and public transport in Voorschoten, higher minimum driving age (i.e. 18 years-old) and greater costs associated with owning and driving cars.

Image was important to adolescents in both locations, in particular for girls. This fits with conclusions by Manning and Allen (1987), and Youniss and Haynie (1992) that adolescent girls experience greater pressure in terms of dress, conformity and social involvement than boys. In both locations, however, ‘cyclists’ were considered to be those people on bikes wearing special cycle clothing. In Voorschoten, unlike Christchurch, students who cycled to

school did not see themselves as cyclists and didn't wear special clothing. This is consistent with research by Gatersleben and Haddad (2010) regarding the promotion of cycling as a day-to-day activity. However, students in Voorschoten recognised high-visibility clothing was useful at night and cycling was not suitable for special events such as school balls. Despite the fact that students in Voorschoten cycled to school, they predominantly did not cycle to school because they enjoyed it but rather because it was a social thing to do and due to habit, practicality and the freedom it gave them. These findings concur with those of Forward (2014) who explored people's willingness to bike and found people at the fifth stage of the transtheoretical model (i.e. the maintenance stage) cycled without reflecting, whereas for those at the fourth stage (i.e. the action stage) cycling was much more deliberated (refer section 4.2.2). Therefore, in terms of the transtheoretical model, for students in Voorschoten cycling was automatic.

8.6.1.3 Perceived Behavioural Control

Some students in Christchurch, in particular year 13 girls, expressed concerns regarding their confidence cycling in traffic and their knowledge of the road rules. This is consistent with findings of Garrard et al. (2006) regarding a lack of cycling ability and cycle skills affecting females in Australia more than males. The existence of separated cycle paths in Voorschoten however, significantly reduced the need for both girls and boys to cycle on busy roads and created an environment where students could cycle confidently and sociably (Birk & Geller, 2006). Therefore, confidence cycling was not an issue for students in Voorschoten. Construction of more separated cycle paths in Christchurch would assist in improving perceived traffic safety for students cycling to school.

8.6.2 Behaviour setting

Unlike Christchurch, distance was not discussed by students in Voorschoten. This was possibly because all but one of the students cycled to school, with the maximum time spent cycling to school being 25 minutes. In Christchurch, for those students who lived between 1 and 4km from school, perceptions of "too far to cycle" increased with year group and were greater for girls than boys. In addition, the average distance travelled by car was less than that

cycled. Therefore, while distance is likely to have an influence at distances of 4km and greater, as 6.6% of students living 1km to 4km from school said it was “too far to cycle”, the influence of distance is questionable.

Fear of traffic was not discussed by students in Voorschoten and did not seem to be an issue. The only reason students discussed for their lack of fear was the existence of separated cycleways. Therefore despite the fact that cycle paths may not always be safe, particularly at intersections with vehicular traffic, consistent with Krizek et al. (2009), there was a perception by students that they were safe. As discussed, however, by Pucher and Dijkstra (2003), many other factors exist in countries such as The Netherlands and Germany to encourage cycling and discourage driving. Contributing factors include shorter trip distances and the high cost and difficulty of vehicle ownership, and the provision of other infrastructure such as “bicycle streets” where cyclists have right-of-way over cars, special bike turn lanes and advance green lights for cyclists. Pucher and Dijkstra (2003) also recognise the contribution of urban design to meet the needs of cyclists, traffic calming of residential neighbourhoods, restrictions on motor vehicle use in cities, traffic education of both motorists and non-motorists, and enforcement of traffic regulations protecting cyclists. Therefore, despite the lack of discussion regarding these factors in focus groups, they all contribute to the safety of students cycling to school in Voorschoten.

In contrast, in Christchurch, traffic safety was a large concern for students. This is likely to be due to the lack of the strategies to encourage cycling as exist in The Netherlands and Germany. A combination of such strategies would be necessary to encourage cycling and improve the perceived and actual safety of cycling in Christchurch. Safety in numbers would also be likely to increase cycle safety, as recognised by Jacobsen (2003).

Personal security was an issue for girls in both Voorschoten and Christchurch at night. However, in Voorschoten, personal security was not an issue during the day, but was an issue for girls at Aranui High School in Christchurch. This probably has more to do with personal security in specific locations within a city rather than any differences between countries with high and low cycling rates. Unlike Voorschoten where all students in focus groups owned bikes, 16% of students in Christchurch said a reason they didn’t cycle to school was because they didn’t have a bike or a “nice” bike. As cycling to school is impossible without a bike, and a bike can be a major expense for many families, this is definitely a limiting factor. The

need for other equipment such as a bike lock, bike carrier or lights was also not a limiting factor in Voorschoten.

Differences in school uniforms may also affect cycling rates in Voorschoten and Christchurch. Year 9 students in Voorschoten were required to wear school uniforms, with girls having the option of wearing a skirt or trousers and boys wearing trousers, and bike styles were more suited to cycling in skirts. Unlike Christchurch, uniforms were not mentioned by students in Voorschoten as a reason for not cycling to school, possibly as the girls' uniform included trousers. As mentioned above, it is generally agreed that cycling rates would be improved through the promotion of cycling as a normal day-to-day activity not requiring special clothing (Gatersleben & Haddad, 2010; Smith et al., 2011) and cycling in a range of clothing, including school uniform, should then be possible. However, possibly due to high cycling rates in Voorschoten, girls' uniforms were probably chosen with cycling in mind, demonstrating it is possible to have a school uniform that is more conducive to cycling. The prevalence of utility bikes in Voorschoten, compared to Christchurch would also make cycling in a skirt easier. Changes to school uniforms and bike type would improve the ability for teenagers in Christchurch to cycle to school.

Unlike Christchurch, the provision of facilities at school that encourage cycling such as cycle racks, or lockers, was not mentioned by students in Voorschoten. Failure to mention this as an issue can be taken as an indication that adequate facilities are provided by the school due to the high percentage of students cycling. Therefore if the prevalence of cycling in Christchurch was increased, any problems regarding the provision of facilities would also be overcome.

Students in Voorschoten had developed ways to carry loads however they recognised carrying fragile food items for school was not possible on a bike. In contrast, the quantity of equipment needed to be carried to school was seen by students in Christchurch as a reason not to cycle. As mentioned in section 6.7.3 it is sometimes the combination of many factors, or the cumulative effect, that deters students from cycling to school. Not being able to figure out how to carry loads may be one factor too many for some students in Christchurch. In Voorschoten, this potential problem was often overcome through the use of panniers or baskets. Descriptive norms may play a part in this behaviour, as the use of such equipment is common in Voorschoten but not in Christchurch. Therefore it is not only the act of cycling that is influenced by descriptive norms but also the use of equipment associated with cycling.

Contrary to the situation in Christchurch, driving to school was not common for teenagers in Voorschoten as drivers could not drive alone until they were 18 years-old, and motoring costs were high. Consequently, older students in Voorschoten were far more likely to cycle to school than drive. Differences between Voorschoten and Christchurch regarding the ability for older students to drive to school would require changes to licensing age, and the costs of buying and running vehicles, which is beyond the scope of this thesis.

Media will continue to have an impact in both localities as norms influence media (Sallis et al., 2006). Furthermore, as cycling grows in popularity in Christchurch, local media will reflect this change, so reflecting the mutually interactive nature of factors in socio-ecological models. Consistent with Behm-Morawitz and Mastro (2008) focus groups with students in Voorschoten show international media such as American movies impact on how students see cycling. However, due to the influence of injunctive and descriptive norms, as evidenced by the differing cycling rates in Voorschoten and Christchurch, it is possible for students to disassociate themselves from such images in localities where norms differ.

8.7 Study Limitations

A number of limitations exist in relation to this study and have been referred to throughout the thesis. The key limitations were as follows:

- Pilot-testing of the survey was not carried out with the sample population. This may have affected the validity and reliability of the survey items.
- Study findings are not generalisable to the Christchurch population of secondary school students due to school and student non-response bias.
- Sample sizes used in analysis of the survey were uneven as more results were analysed for boys than girls (63% male and 37% female) and for year 9 students than for year 11 or 13 students (55%, 23% and 21% respectively).
- The sample size for several individual schools was low and therefore it was difficult to compare the barriers to cycling between the schools. It was also even more difficult to compare students of different age groups and gender between the schools as sample sizes became even smaller.
- For the hierarchical regression analysis, the percentage of survey responses for schools varied from 2.7% to 28% (N=331). As a result, the greatest percentage of responses were from Christchurch Boys' High School and Riccarton High School,

while the smallest percentage of responses were from Christchurch Girls' High School. These differences were not taken into account in the hierarchical regression analysis and may have influenced results.

- Twenty-eight percent of the surveys obtained were not included in the analyses as insufficient information was provided to enable the distance from school to be calculated and a further 30% were excluded as they lived less than 1km or more than 4km from school.
- Due to the wording of the questions, too much overlap existed between questions regarding past behaviour (section 2, Q17) and current behaviour (section 1, Q8) and past behaviour was too highly correlated with intention. Therefore past behaviour was not used to predict behaviour or intention.
- The applicability of the PWM to cycling. The PWM was developed in relation to risky teenage behaviours such as smoking, drinking of alcohol and sex. As such, the decision-making processes, and the influence of willingness, may be very different to that concerning cycling to school.
- Only two focus groups of a total of ten students were completed in the Netherlands and therefore the sample size was small, particularly compared to Christchurch where 12 groups were completed.
- Comparison of survey and focus group results should be done with caution due to the variation in sample sizes between the two methods.
- Information about how the surveys were distributed by teachers was not provided. Information provided by students however showed (with the exception of CGHS) they were all in social science, English or statistics classes.
- At CGHS, the electronic survey was advertised on the school web page and carried out voluntarily by students in their own time. Consequently, these students self-selected. This may have biased results as students who cycled to school may have been more likely to answer the survey. The small sample size of this group (9 analysed) would however have reduced any possible adverse effects of this sample.
- The research undertaken was cross-sectional whereas the TPB is most effective in predicting behaviour change over time. As a consequence, it is not possible to make conclusions about causality as a result of this research. However, predicting the cycling behaviour of teenagers was not an objective of the research, and therefore this limitation did not have a major effect.
- All information regarding behaviour was provided by participants via self-report, rather than observation and is therefore subject to social desirability bias. This was evident in relation to questions regarding reasons for not cycling to school, where reasons such as being too far to bike to school varied between different year groups and between girls and boys.

8.8 Summary of key findings, recommendations and further research

8.8.1 Conclusions regarding the principle research objectives of this thesis

Five key findings exist in relation to the main objectives of this research. Firstly, one fifth of all students surveyed in Christchurch cycled to school, with on average those travelling by bicycle travelling further than those travelling by car. Of those surveyed, girls, older students, and students of low socio-economic status cycled less than boys, younger students and those from high decile schools. Few girls cycled at any age. Secondly, of the two theories, the TPB was a better predictor of teenage cycling to school than the PWM. Thirdly, gender and socio-economic status were shown to influence whether students intended to cycle to school.

However, when variables of the TPB and PWM were added, social pressure by friends, as perceived by teenagers (especially girls), had the greatest influence over this decision. This was closely followed by perceived social pressure by parents with respect to students' travel choices and in addition, teenagers' attitudes towards cycling. Fourthly, age and aspects of perceived behavioural control such as students' perceptions of their ability to cycle in traffic, as well as factors related to behaviour setting, such as the provision of separated cycle paths and the influence of the media, also influenced teenagers' decisions to cycle to school. Lastly, when comparing cycling by students who had lived all their lives in a location with low cycling rates, to those who had lived in locations with low rates of cycling and moved to a location with high rates of cycling, the main factors that favoured cycling in the latter group were the provision of cycling infrastructure that facilitated social and safe cycling, and the existence of norms in favour of cycling.

8.8.2 Key influences on student cycling rates in Christchurch

To put the findings of this thesis into a practical context, and increase the proportion of teenagers who cycle to school in Christchurch there are many direct initiatives that are recommended. These range from education programmes to infrastructure improvements and include specific issues such as helmets and bike types. Findings of this thesis support the use of different approaches for males and females, younger and older students and students from areas of lower socio-economic status. Additional conclusions and recommendations in terms of intrapersonal factors and behaviour setting are as follows:

Intrapersonal factors

In relation to intrapersonal factors, recommendations include those related to norms, image and cycling confidence. As perceived social pressure by friends and parents with respect to students' travel choices was the most significant factor affecting cycling to school by adolescents, any programmes to increase rates of student cycling should take these factors into consideration. In addition, due to the importance of image for adolescents (particularly girls), a law change to make helmets optional together with the introduction of new bike styles and helmets could reduce embarrassment and increase student cycling rates. Lastly, a lack of cycling confidence by high school students could be addressed through providing cycle skills education programmes in high schools. These could be similar to the Cycle Safe Programme currently offered to Christchurch primary schools by the Christchurch City Council.

Behaviour setting

Recommendations related to behaviour setting include those related to traffic safety, equipment provision and maintenance, clothing, bike styles and personal security. The vulnerability of students while cycling in traffic could be improved through the provision of separated cycle infrastructure, and public safety campaigns. In addition, a lack of cycling equipment, and knowledge of cycle maintenance, could be remedied through the involvement of Not-For-Profit and community organisations in the provision of cycles and bike maintenance programmes for teenagers. The promotion of cycling as a normal day-to-day activity would reduce the perception by students that special clothing is required for cycling. Furthermore, changes to school uniforms and an increase in the availability and affordability of Dutch-style bikes, through promotion of this style of bike by bike retailers and the media, would encourage more people to cycle and create social norms in favour of cycling. Increasing the percentage of students cycling would also partially address fears regarding personal security as this is improved when cycling with others rather than alone.

Funding by schools, local and central government to provide cycling facilities and behaviour change programmes is also recommended. In particular, school boards could allocate more funds to provide covered secure cycle parking and lockers to store bike helmets. The Government could also provide funding to assist local councils and schools to develop and implement travel plans. It could also implement behaviour change programmes such as Australia's TravelSmart program (in South Australia, Victoria and Western Australia) to assist individuals to identify barriers to cycling to school and ways to overcome them. Government implementation of nationwide programmes, such as Safe Routes to School (SRTS) programmes in the US, Canada, UK and Australia, would also encourage children's independent travel and active transport, and improve the safety for those walking and cycling to school. To be effective in relation to teenagers, such programmes would need to be tailored to their needs.

This thesis also showed that the media also influenced adolescent cycling to school and recognised that the relationship between societal attitudes and norms, and the media was bi-directional. On balance, however, it is concluded that the media has significant influence on students in relation to their attitudes to cycling to school and that student cycling rates could be increased through changes in the media in favour of cycling.

8.8.3 Key influences on student cycling rates in Voorschoten

Research in Voorschoten enabled a comparison to be made of cycling by students who had lived all their lives in a location with low cycling rates, with those who had lived in locations with low rates of cycling and moved to a location with high rates of cycling. The following conclusions are made regarding intrapersonal factors and behaviour setting:

Intrapersonal factors

Relevant intrapersonal factors identified in Voorschoten included those related to the sociability and safety of cycling, cycle confidence, helmet wearing, transport stereotypes, clothing and attitudes to driving. The sociability and safety of cycling was enhanced significantly in Voorschoten by the existence of separated cycle paths. Confidence cycling was also not an issue for students in Voorschoten largely due to the existence of separated cycle paths. Cycling was also not considered to be embarrassing in Voorschoten due to the lack of stigma associated with cycling, the lack of compulsory helmet laws, and the absence of social vulnerability associated with cycling alone. Similar to Christchurch, in Voorschoten, cyclists were considered most likely to be sporty, healthy and young, and similar transport stereotypes applied with respect to other modes of transport. In Voorschoten, however, cycling was seen as an activity for people of different ages and although the motivations for cycling differed, girls cycled equally to boys. Students in Voorschoten also had similar favourable attitudes to cars as students in Christchurch. However, their low rates of driving to school were due to the high use of bicycles and public transport, higher minimum driving age and greater costs associated with owning and driving cars. In Voorschoten, unlike Christchurch, students who cycled to school did not see themselves as cyclists and didn't wear special clothing.

Behaviour setting

In Voorschoten, relevant factors related to behaviour setting included those related to distance, cycling equipment, school uniform, bike type, heavy loads, traffic fears, the media and the combination of factors. Distance to school, a lack of cycling equipment, school uniforms and bike type, the carrying of heavy loads and fear of traffic were not barriers to cycling to school for students in Voorschoten. Fears regarding traffic were largely allayed due to the existence of separated cycle paths as students had fewer interactions with motorised vehicles. All students in focus groups possessed bicycles and maintained them. School uniforms and bike types encouraged cycling and norms in relation to the use of equipment such as bike panniers avoided problems with heavy loads. Overall, however, many factors related to behaviour setting exist in The Netherlands to encourage cycling and discourage driving. These include the high cost and difficulty of vehicle ownership, the provision of infrastructure such as “bicycle streets”, special bike turn lanes, advance green lights for cyclists, traffic calming of residential neighbourhoods, restrictions on motor vehicle use in cities, traffic education of both motorists and non-motorists, and enforcement of traffic regulations protecting cyclists. Similar to Christchurch, negative media images of cycling (particularly in movies) affected students in Voorschoten, however, due to the influence of perceived social pressure from parents and friends, and as friends cycled, students in Voorschoten cycled despite the influence of media.

8.8.4 Further research

Further research on various aspects of cycling to school by adolescents in Christchurch could include research related to intrapersonal factors and behaviour setting.

Intrapersonal factors

Further research on intrapersonal factors could include research in relation to ethnicity, culture and race, the contribution of different types of norms, habit, parental gender differences, behaviour stages, previous cycling, helmets and bike types. This research has

identified that ethnicity, culture and race probably influences cycling to school in Christchurch, however, further research would be necessary to confirm this. This thesis also identified that it would be worth considering the relative influence of norms related to what students think their friends do compared to what they think their friends think they should do (i.e. descriptive versus injunctive norms), and the role of habit in relation to cycling to school. The need for different behavioural change programmes for male and female parents/caregivers could also be considered, in addition to the stage of behaviour change a person is at (as recognised by the Transtheoretical Model) and whether this information could be used effectively to increase the percentage of adolescents cycling to school. Further research could also consider the links between previous and existing cycling to school and whether the embarrassment associated with adolescent cycling in NZ could be avoided by the use of new types of helmets and different styles of bicycle.

Behaviour setting

Further research concerning behaviour setting could include research on travel trends, distance, continuity and connectivity and helmet laws. Specifically, research could consider whether international trends showing a decrease in the vehicle kilometres travelled by young people also apply in Christchurch. Perceptions of distance by students and how close is too close or too far to cycle could also be examined, together with the link between continuity, connectivity and adolescent cycling. Further research could also consider whether the legal requirement to wear helmets in NZ affects cycling rates for teenagers more than other age groups as the results of focus groups, and cycling rates before and after the introduction of compulsory helmet laws in NZ, indicate this may be the case.

8.8.5 Wider recommendations

As a result of the 2010/2011 Canterbury earthquake sequence, Christchurch is a city brimming with opportunities to increase cycling rates for all ages. Increases to the proportion of teenagers cycling to school would have benefits for future adult cycling rates. This would

change the transport culture of Christchurch from a car-centric culture to one that is less car-centric, with many benefits in terms of health, traffic congestion, climate change, children's rights and social capital. To increase the proportion of adolescents cycling to school requires an ecological perspective with change at multiple levels, targeting individuals, the behaviour setting, and the policy, information, natural and social cultural environments in accordance with the above recommendations. Conclusions of Sallis et al. in relation to the massive decline in smoking in the US are applicable — there is no single “magic bullet” (Sallis et al., 2008, p. 476). So when people ask me, “so why don't teenagers cycle to school?” I tell them it is largely about norms and what's normal, but there are lots of reasons and change is required at many levels.

Appendices

Appendix A: Human Ethics Committee application, additional information, amendment and approvals

UNIVERSITY OF CANTERBURY

HUMAN ETHICS COMMITTEE

APPLICATION FOR REVIEW & APPROVAL

This form should be completed in the light of the Principles and Guidelines issued by the Human Ethics Committee. Applicants must read those before filling out the application form. The latest versions of both the Guidelines and the Application Form can be found on the website of the Human Ethics Committee.

website: <http://www.canterbury.ac.nz/humanethics>

This application form is to be used for Applications NOT covered by the Educational Research Human Ethics Committee (ERHEC)

NOTE: This electronic copy may not have sufficient space for completion of all parts of the form if downloaded as a blank copy of the application form. It is intended as a template for use by those staff and students who have access to a word processor. When typing in please type where the paragraph marks start after each question, not in the actual boxes.

Please submit **SIX printed or typed copies** and **ONE electronic copy** of the completed application duly signed by applicant and supervisor or Head of Department, and all relevant documents referred to in questions 3, 7, 8, 9, 10, 11, 15 (i.e. authorizations, approvals, information and consent forms). Hard copies should be sent to the Secretary, Human Ethics Committee, Okeover House and electronic copies to human-ethics@canterbury.ac.nz.

1. PROJECT NAME: Secondary School Travel in Christchurch 2012
2. NAME OF APPLICANT: Jillian Frater

Contact Telephone No: 03 3642987 ext 4842 or 0272287470

UNIVERSITY DEPARTMENT (or other contact address): Department of Geography

EMAIL ADDRESSES: jillian.frater@pg.canterbury.ac.nz

STATUS OF PROJECT (eg SOCI XYZ class project, M.A., M.Ed., M.Sc., Ph.D., Staff research study)

Ph.D

NAME OF SUPERVISOR: Prof. Simon Kingham

OTHER INVESTIGATORS: George Williams (Ph.D. candidate)

SIGNED BY: Applicant: | Date: 28 June 2012

HOD/Supervisor: Date: 28 June 2012

The checklist on the following page must be completed and signed by the applicant and, if the applicant is a student, by the applicant's supervisor

CHECK LIST

Please check the following items before sending the completed form to the Committee.

All the necessary signatures on page 1 have been obtained. [√]

All the necessary approvals under Question 3 have been obtained or are the subject of correspondence of which copies are attached. [√]

A copy of any questionnaire, with an appropriate rubric at the beginning or accompanied by an appropriate covering page, is attached. [√]

A list of interview topics and, for a structured interview, a detailed list of questions, is attached. [√]

A copy of any advertisement, or notice, or informative letter asking

for volunteers is attached.

NA

A copy of each information sheet required is attached.

[√]

A copy of each consent form required is attached.

[√]

A copy of the required debriefing sheet is attached.

NA

Attention to the preceding check list is intended to ensure that the application and its documentation have been thoroughly reviewed by the applicant and (where applicable) by the supervisor and that the preparation of the project is up to the standard expected of and by the University of Canterbury.

The signature of the applicant will be understood to imply that the applicant has designed the project and prepared the application with due regard to the Principles and Guidelines of the HEC, that all the questions in the application form have been duly answered and that the necessary documentation has been properly formulated and checked.

Signature of Applicant

The signature of the supervisor will be understood to imply in addition that, in the judgment of the supervisor, the design and documentation are of a standard appropriate for a research project carried out in the name of the University of Canterbury or for training in such research.

Signature of Supervisor



**Delete
whichever is
in-
applicable**

- 3 (a) WILL THE PROJECT REQUIRE ETHICAL APPROVAL FROM OTHER BODIES? eg Health and Disability Ethics Committee (HDEC) **No**
- NOTE: To save time, it is recommended that in the case of HDEC applications, an application is made concurrently with the application to the UC HEC.*
- (b) WILL THE PROJECT REQUIRE APPROVAL FOR ACCESS TO THE PARTICIPANTS FROM OTHER INDIVIDUALS OR BODIES? **Yes**
- Approval is bring sought from the Board of Trustees of each school
- Attached is a copy of the following documents:
- A letter to the chairperson of the Board of Trustees for each school
- The consent form for Boards of Trustees
- The consent form for teachers or other school staff
- Assent form for students taking part in Focus Groups
- The information sheet for teachers or other school staff
- The information sheet for Parents
- The information sheet for students selected to take part in Focus Groups
- The questionnaire
- (c) WILL THE PROJECT REQUIRE MAORI CONSULTATION? **No**
- If Yes, please provide evidence that consultation has occurred or, if underway, provide a copy of approval once gained.
- (d) WILL THE PROJECT REQUIRE COMMUNITY CONSULTATION? **No**

If Yes, please provide evidence of appropriate consultation.

- 4 (a) IS THE PROJECT BEING EXTERNALLY FUNDED? **No**

If Yes, please identify the source of funds.

- (b) IS THE PROJECT COMMISSIONED BY OR CARRIED OUT ON BEHALF OF AN EXTERNAL BODY? **Yes (in a very minor way)**

The Christchurch City Council supports the survey in relation to informing future school travel planning and impacts for the city. The project has not been commissioned by the City Council. Question 11 of the survey enables participants to tick “I need some proper training” as a reason for not cycling to school. This was included in the survey at the suggestion of City Council staff.

- (c) IS THE PROJECT TO BE PART OF THE CEISMIC DIGITAL ARCHIVE? **No**

If so, please ensure all participants are made aware of this, and have filled in the

UC CEISMIC Quake Studies consent form. See www.ceismic.org.nz.

Further, please ensure that all participants are made aware of any of the above in information sheets and consent forms provided.

A. DESCRIPTION OF THE PROJECT

Answer the following questions in language which is, as far as possible, comprehensible to lay people.

5 AIM

- (a) The objective of the project is determine the relative importance of attitudes, what friends do, the things people think they have control over, and image, on decisions to cycle to school by secondary students in Christchurch.

- (b) The type of information I am seeking from secondary students is information about what they think of cycling, what their friends, parents/caregivers would think if they did cycle, whether they have any intention of cycling to school, how many of their friends cycle to school, what travel decisions they think they have control over, whether they have cycled to school, whether they would cycle to a friend's house, their evaluation of people their age who cycle and how similar they are to these people.

- (c) My hypothesis is that for secondary school students in Christchurch, image and what their friends do play a major role in whether or not they cycle to school.

6 PROCEDURE

Parents will be informed of the survey and focus groups via the school website and/or school newsletter and will be directed to a website where they can see the questions to be asked. The website will include the Information for Parents as attached to this application and will tell them that if they want any further information about the research or if they do not want their child to participate in the research, they should contact the school, George or myself. (Our email addresses will be included on the website.)

I will interview a teacher or another staff member at each school to find out some background information about the facilities provided by the school for cyclists, their estimations of the numbers of students cycling to school and their opinions regarding the reasons students choose not to cycle. Each interview will be no longer than 1 hour. I will give the interviewees the opportunity to check a

transcript of the interview.

Students will be told about the survey by their teachers. Teachers will be asked to give students an electronic link to the survey, so that as many surveys are possible are distributed electronically. If a teacher considers it would be preferable and more convenient from their perspective for students to be given paper copies of the survey, these will be supplied.

Teachers will be asked to ask students to complete the survey during school time.

Information provided in a rubric at the beginning of the survey will tell students about the purpose of the survey and indicates that by completing the questionnaire it will be understood that they have consented to participate in the project, and that they consent to publication of the results of the project with the understanding that anonymity will be preserved. As it is expected (and hoped) that the majority of surveys will be carried out electronically, the signature of students will not be obtained.

Any completed paper surveys will be returned to a labelled drop-box at the school reception.

In order to reduce the workload and interruption for teachers and students, my survey will be combined with a survey by Ph.D. candidate George Williams. George's survey is principally concerned with the practical reasons why secondary students do not cycle to school, what would tempt them to cycle and the mapping of routes to school, including any problem spots. Data such as participants year group, gender, how they usually travel to school, what would tempt them to cycle and how far they cycle will be shared by both of us. Lucy Johnston (Postgraduate Dean) has confirmed it is acceptable for us to share data so long as this is made clear to participants and it is also made clear in our respective theses.

The combined survey will take between 15 and 20 minutes for students to complete.

Following the completion of the survey, I plan to hold focus groups of 6-8

students at year 9 and 13, at two or three schools to gain more information in relation to the questions asked in my survey. Each focus group will be no longer than 1 hour. Students will be asked to provide their email address in the survey if they are willing to take part in focus groups. These email addresses will not be used for any other purpose and will be deleted following the completion of the focus groups. I will give the participating students the opportunity to check a transcript of the interview.

- 7 DOES THE PROJECT INVOLVE A QUESTIONNAIRE? **Yes**
- 8 (a) DOES THE PROJECT INVOLVE A STRUCTURED INTERVIEW? **Yes**
 A list of the topics to be covered and the questions are attached.
- (b) DOES THE PROJECT INVOLVE AN UNSTRUCTURED INTERVIEW? **Yes**
 A list of the topics to be covered is attached.
- (c) IF THE PROJECT INVOLVES AN INTERVIEW OF EITHER TYPE, WILL IT BE RECORDED BY: AUDIO-TAPE **Yes**
 OR VIDEO-TAPE? **No**
NOTE: This also covers focus groups.
- (d) WILL THE PARTICIPANTS BE OFFERED THE OPPORTUNITY TO CHECK THE TRANSCRIPT OF THE INTERVIEW? **Yes**
 This also covers focus groups. I will complete the transcription of the interview and focus groups.
NOTE: it is normal practice to have participants review their transcription. If this is not to be the case, please explain why you believe it is not necessary. Participants should be informed of interview recording and transcription review.

B. PARTICIPANTS

9 (a) WHO ARE THE PARTICIPANTS?

Category 1: Teachers or other school staff

Category: Year 9, 11 and 13 students

(b) HOW ARE THEY TO BE RECRUITED?

Category 1: By the Head of Department Social Sciences at each school

Category 2: By teachers at their respective schools.

(c) WILL ANY FORM OF INDUCEMENT BE OFFERED?

Yes

If Yes, please give details and a brief justification.

Three \$50 vouchers for cycle clothing from Ground Effect will be available for students who answer the survey in an appropriate way.

An inducement is being offered to increase the response rate for the survey.

(d) IF A SELECTION FROM A GROUP IS NECESSARY, HOW WILL IT BE MADE?

For the focus groups, I want to eliminate those people who live too far away from the school and too close to the school, as cycling is probably not a sensible option for either group. These students will be eliminated through their responses to questions in the survey about how they get to school and where they travel from. The approximate distance students live from the school will be calculated based on their answer to the question 12 in the survey where students are asked to name the street they live on and then the next nearest street to their house.

(e) HOW MANY PARTICIPANTS (OF EACH CATEGORY, WHERE RELEVANT) DO YOU INTEND RECRUITING?

Category 1: 13 participants

Category 2: 1950 participants

C. INFORMATION AND CONSENT

10. WHAT INFORMATION IS BEING GIVEN TO PROSPECTIVE PARTICIPANTS?

A copy of the Information Sheet for teachers and other school staff is attached.

The attached survey for students contains a rubric at the beginning of the survey with information for students about the survey.

NOTE: Projects which involve only an anonymous questionnaire may not necessarily require a separate information sheet, provided that the rubric of the questionnaire includes your name and contact number as well as the other points contained in the model shown in the Guidelines. In general, however, the HEC recommends that participants be given an information sheet, which they may retain, unless there are good reasons against such a procedure.

11. HOW IS INFORMED CONSENT TO BE OBTAINED?

- (a) The survey and focus groups will be strictly anonymous, an information sheet is supplied and informed consent is implied by voluntary participation in filling out a questionnaire (include a copy of the rubric for the questionnaire as in Appendix C of the Guidelines) **Yes**

This means you do not know the identity of any of the participants and will not include any personal participant details.

- or (b) The interviews will not be anonymous, but confidential and informed consent will be obtained through a signed consent form (a copy of the consent form and information sheet is included) **N/a**

This means that while I will know the identity of the participants, with respect to the data provided, I will not make their identity public.

Where confidentiality is promised, what will be done to ensure that the identities of participants cannot be known by unauthorized persons? (e.g. use of pseudonyms and disguising of identifying material).

In transcriptions of the interviews, teachers or other school staff will not be referred to by their real names but only as teacher A etc.

- or (c) The research is neither anonymous nor confidential and informed consent will be obtained through a signed consent form (include a copy of the consent form and information sheet). **N/A**
- or (d) Informed consent will be obtained by some other method – please specify and provide details. **N/A**

12 ARE THE PARTICIPANTS COMPETENT TO GIVE INFORMED CONSENT ON THEIR OWN BEHALF?

NOTE: Children and young adults under the age of 16 years (or 18 years if still at school) require parental/caregiver consent as do adults with disabilities that limit comprehension and consent. Such participants should be provided with a suitable information sheet and an assent form where practicable.

Category 1:

Category 2:

Yes

No

These participants are aged between 12 and 18 years-old and attend secondary school. Parents will be informed of the survey and will be able to view the survey via the school website and/or the school newsletter. As a result, they may choose not to allow their children to answer the survey.

Students involved in focus groups will be given an information sheet and an assent form.

D RISK, DECEPTION, PRIVACY

13. WHERE WILL THE PROJECT BE CONDUCTED?

The interviews with teachers will either be conducted at their schools or at a nearby café.

Students will be asked to complete the surveys at school.

Focus groups will take place at school. An adult research assistant will be present at each focus group.

14. FORESEEABLE RISKS TO THE PARTICIPANTS

- (a) Is there any risk to physical well-being? **No**

If yes describe processes in place:

- (b) Could participation involve mental stress or emotional distress? **No**

If yes describe processes in place:

- (c) Is there a possibility of giving moral or cultural offence? **No**

If Yes, describe processes in place and consultation/awareness undertaken:

15. IS DECEPTION INVOLVED AT ANY STAGE OF THE PROJECT? **No**

If Yes, please

- (a) Explain how and why it is to be used and how the participants will be 'debriefed' following their participation in the project.

- (b) Attach a copy of the debriefing sheet prepared for use by the researcher or for distribution to the participants after their participation in the project or after the completion of the project.

16. WILL INFORMATION ABOUT THE SUBJECTS BE OBTAINED FROM THIRD PARTIES? **No**

This includes 'snowball' recruitment and also the accessing of potential participants via a third party.

In general third party contact information should not be given directly to the researcher – participants should contact the researcher and/or agree to be contacted.

If Yes, please state:

- (a) The identity of the third party or parties.
- (b) Why such information is needed.
- (c) Whether appropriate consents for access to such information have been or will be obtained.
- (d) Whether the use of such data in your research project needs the consent of the participants.

F DATA STORAGE AND FUTURE USE

17 HOW WILL THE DATA BE STORED?

- (a) Provide details of where the data with identifying information will be securely stored.

Data will be stored at the University of Canterbury on a password protected computer and in a locked filing cabinet. Email addresses given by students for the purpose of allocating incentives will be removed once the winners of the incentives are drawn. Email addresses given by students for the purpose of determining focus groups will be removed once the focus groups have taken place and participants have been given the opportunity to review transcripts. No raw data will be provided to the schools.

- (b) Provide details of where the data with no identifying information be securely stored.

Data will be stored at the University of Canterbury on a password protected computer and in a locked filing cabinet. No raw data will be provided to the schools.

- (c) Who, apart from the researcher and their supervisor (where applicable) will have authorised access to the data? George Williams (fellow Ph.D. candidate).

Note: Research Assistants and Transcribers need their own confidentiality forms and their participation needs to be made known to participants.

- (d) What will be done to ensure that unauthorised persons do not have access to the data?

Data will be stored at the University of Canterbury on a password protected computer and in a locked filing cabinet. No raw data will be provided to the schools.

- (e) What will happen to the raw data at the end of the project?

The raw data will be stored for 10 years and then will be destroyed.

18 WHAT PLANS DO YOU HAVE FOR PUBLICATION OF THE DATA?

A summary of results will be provided to each school. Results will also be included in my Ph.D. thesis.

19 ARE THERE PLANS FOR FUTURE USE OF THE DATA BEYOND THOSE ALREADY DESCRIBED?

Yes

The data may be used in peer-reviewed academic publications and may be presented in departmental seminars and conference presentations. The commitment to maintain the anonymity of respondents and confidentiality would be maintained in any such presentations or publications.

Email received from HEC 25/07/2012

(Questions from HEC in black. Replies in red.)

Dear Jillian

The Human Ethics Committee has reviewed your application and raised several questions which they would be grateful for your feedback on/response to.

In the information sheets, please clearly state that a PhD is a public document via the UC library database. **All three information sheets have been altered and each now clearly states that a PhD is a public document that can be accessed via the UC library database.**

Please clarify what is meant by answering this survey “in an appropriate way”? **This phrase has been deleted from the survey.**

All forms should include contact details for the University of Canterbury Human Ethics Committee. **This has been done.**

While the letter to schools mentions the Christchurch City Council, this is not mentioned in letters to teachers, parents or pupils nor is it stated at Question 4b of the application; please clarify. **Information sheets for parents, teachers and pupils have been altered to include mention of the Christchurch City Council. Its involvement is also now addressed in question 4b.**

Is video taping required for focus groups? It would seem that it complicates confidentiality issues yet would have no advantage for gathering information? If video tape is not used then there are no issues with storage and use of the tape. **Video-taping has now been deleted from my application.**

It is important to ensure the gathering of data for participation in the focus group and the draw are kept entirely separate from the questionnaire. Please provide a link at the end of the questionnaire to another page where the email address can be provided for either or both of

those options. This will keep the questionnaire entirely anonymous. **The survey has been changed as suggested.**

Please ensure that Question 11 is clearly answered to cover both the anonymous surveys and the confidential interviews. This needs to be clearly distinguished and answered in the application. **Changes have been made to my answer to question 11 as suggested**

Please clarify how you seek to obtain information about how far students live from school. It is inappropriate to obtain their specific addresses. **The approximate distance students live from the school will be calculated based on their answer to the question 12 in the survey where students are asked to name the street they live on and then the next nearest street to their house (as per question 9d of HEC form).**

Please clearly state who is doing the transcription. **I will do the transcription (see my answer to question 8d of HEC form).**

All forms and surveys need to be checked for spelling and grammar. **This has been done.**

Please also note that the survey refers specifically to Riccarton High School. **This reference has been deleted from the survey.**

The Board of Trustee consent form needs to have the statement removed regarding the withdrawal of information provided. **This has been done.**

The information sheet for focus groups needs to include the expectation of confidentiality by participants of discussion and data gathered within focus groups. **This has now been included.**

It needs to be clearly stated in the teacher information sheet what the teacher is expected to do; is it to ask students to complete the survey or is it to complete the interview? Further to this, what steps are in place to ensure there is no coercion? **Paragraph 6 of the information sheet for teachers has been altered to mention that teachers may be asked to take part in an interview. Details of what the teacher is expected to do are included in paragraph 7. To make it clear to teachers that students do not have to participate in the survey, paragraph 7 has also been altered to read: “You and/or your students have the right to withdraw from the project at any time, and can withdraw any information provided without penalty.”**



HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2012/89

30 July 2012

Jillian Frater
Department of Geography
UNIVERSITY OF CANTERBURY

Dear Jillian

The Human Ethics Committee advises that your research proposal "Secondary school travel in Christchurch 2012" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 25 July 2012.

Best wishes for your project.

Yours sincerely

Michael Grimshaw
Chair
University of Canterbury Human Ethics Committee

Email to HEC 20/05/2013 requesting an amendment to HEC application

Dear Lindsey

Below is the email approving my application to the Human Ethics Committee in August last year.

Since completing this application, I was lucky enough to get a Claude McCarthy Scholarship to attend a conference in Vienna and conduct research in Amsterdam.

In Amsterdam I plan to run two focus groups with teenagers, as I have done in Christchurch. Through this work I hope to be able to make some conclusions about the differences between the two countries. Students will also complete the same survey as those in New Zealand (with the deletion of one part of the survey asking about routes to school).

I have made some small modifications to my information sheets and questions for the focus groups, so they are appropriate and relevant for the students in Amsterdam.

Can you please confirm for me whether my existing HEC approval will sufficient.

I leave for my trip on 8th June 2013.

Thank you

Jillian Frater
PhD Candidate
University of Canterbury
Private Bag 4800
Christchurch 8140
ph +64 33667001 x4842
cell +64 272287470
email: jillian.frater@pg.canterbury.ac.nz



HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2012/89

28 May 2013

Jillian Frater
Department of Geography
UNIVERSITY OF CANTERBURY

Dear Jillian

Thank you for your request for an amendment to your research proposal "Secondary school travel in Christchurch 2012" as outlined in your email dated 20 May 2013.

I am pleased to advise that this request has been considered and approved by the Human Ethics Committee.

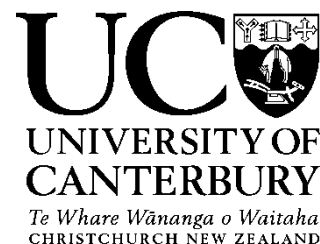
Please note that this amendment is granted subject to receipt of a note from the researcher to confirm that all of the Netherlands legal and regulatory requirements around research such as appropriate parental, school and community consents and ethics approvals from the relevant Government authorities have been met. Where these are necessary, please ensure that UC Human Ethics Committee has the relevant copies.

Yours sincerely

A handwritten signature in black ink, appearing to read 'L. MacDonald'.

Lindsey MacDonald
Chair, Human Ethics Committee

Appendix B: Request letter sent to schools



20 July 2012

Christchurch
City Council

Board Chair ... High School

Dear

Christchurch Secondary Schools Travel Research 2012

The University of Canterbury, in conjunction with Christchurch City Council, are conducting research into daily travel amongst secondary school students in Christchurch. The information collected will be used by Christchurch City Council to inform future school travel planning and impacts for the city. It will also be used in projects by researchers at the University of Canterbury.

We would very much like your school to be part of this research and hereby invite you to participate.

The research will include a survey of students, an interview with a staff member and may possibly include focus groups with 6-8 pupils. The research will include students in years 9, 11 and 13.

The survey will be carried out electronically, with each survey taking between 15 and 20 minutes to complete. A draft copy of the survey is attached and can be viewed at <https://sites.google.com/site/christchurchtravelsurvey/>.

Participation in the research is entirely voluntary and the school and individual students have the right to withdraw at any stage. If a school or student does withdraw, we will remove any information relevant to them.

The data collected in the research will be accessed by PhD candidates George Williams and Jillian Frater under the supervision of Professor Simon Kingham (Geography).

Confidentiality and anonymity are assured as part of standard departmental procedure.

All data collected will be securely stored in the Geography Department at the university and will be destroyed 10 years after the research is completed. This project will be subject to ethical approval from the University of Canterbury Human Ethics Committee before it can proceed. Prior to obtaining this approval, we are seeking agreement in principle to your school's participation.

In the interest of keeping the process as simple as possible, it is envisaged that research will be completed during school time as this avoids the need for written parental consent for each individual student. Interested parents will be able to view the entire survey online beforehand and advise their children individually.

The results of the research will be available to your school for use in your travel planning. Results may also be reported or published as papers at conferences attended by the researchers.

Our current intention is to disseminate the surveys during the third term at a time that suits your school. We expect to open the survey for a period of one week, but this too is flexible.

We appreciate that the success of this study depends on cooperation from your school and would like to make the process as simple and as easy as we can. If you have any questions about the study or the implementation of the research, please contact either Jillian Frater or George Williams on the phone numbers or email addresses below.

If you are happy to agree in principle to participate, without the need for further information, please fill in the attached form and return it in the enclosed pre-addressed envelope.

Either way we will follow up this letter with a phone call to discuss the proposal further and are more than happy to present further information in person if this would be helpful.

Yours faithfully

George Williams

Jillian Frater

Professor Simon Kingham

George.williams@pg.canterbury.ac.nz

Jillian.frater@pg.canterbury.ac.nz

Simon.kingham@canterbury.ac.nz

03 341 2133

03 364 2987 xt 4842

03 364 2987 xt 7036

cc.

Principal

... High School

Appendix C: Information sheet for teachers in Christchurch

College of Science

Department of Geography

University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x4842, Fax: + 64 364 6907

Emails: jillian.frater@pg.canterbury.ac.nz

george.williams @pg.canterbury.ac.nz



25 July 2012

SECONDARY SCHOOL TRAVEL IN CHRISTCHURCH 2012

INFORMATION SHEET

The University of Canterbury, in conjunction with the Christchurch City Council, is conducting research into the daily travel of secondary school students in Christchurch. The information collected will be used by Christchurch City Council to inform future school travel planning and impacts for the city. It will also be used in additional projects by researchers at the University of Canterbury.

You are invited to participate in this research project.

The aim of this project is investigate the reasons why the number of secondary school students cycling to school has decreased in recent years and to investigate routes taken by students on their journey to school.

The results of the research will be available to your school for use in your travel planning. Results may also be reported or published as papers at conferences attended by the researchers. A report on the results of the research for your school will be available once the analysis is completed.

The research will involve an interview of a teacher or another staff member at the school and the completion of surveys by students at years 9, 11 and 13. It may possibly also include the

selection of some students from these year groups to participate in focus groups of 6-8 pupils. It is anticipated that both staff interviews and focus groups will take no longer than one hour each.

In giving your consent to participate in this research, we may ask you to participate in an interview where we hope to gain some information about cycling at your school including the number of children cycling, facilities provided for cyclists and general questions about school travel.

It is hoped that the survey will mostly be carried out electronically. Where this occurs, we would like your assistance with telling students about the survey, providing a link to the survey and if possible, providing time at school for students to complete the survey. If it would be more convenient for you, we can provide paper surveys for pupils. In this case we would also need your help with distribution and collection of surveys. We estimate each survey will take between 20 and 30 minutes to complete. Following the completion and collation of the surveys, we may approach you with a view to carrying out focus groups of 6-8 pupils. As part of this process we may require your assistance with organising a venue to carry out the focus groups and arranging a suitable time. You and/or your students have the right to withdraw from the project at any time, and can withdraw any information provided without penalty.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of individual teachers and students will not be made public. To ensure anonymity and confidentiality, data will be stored at the University of Canterbury on a password protected computer and in a locked filing cabinet. Email addresses given by students for the purpose of allocating incentives will be removed once the winners of the incentives are drawn. Email addresses given by students for the purpose of determining focus groups will be removed once the focus groups have taken place and the information collated.

The project is being carried out as a requirement for their respective Ph.D.s in Geography by Jillian Frater and George Williams under the supervision of Professor Simon Kingham, who can be contacted at +64 3 364 2907 x7936. He will be happy to discuss any concerns you may have about participation in the project. All Ph.D.s are public documents and are available through the University of Canterbury library database.

The project has been reviewed and approved by the University of Canterbury Human Ethics Committee. It can be contacted via Lynda Griffioen (Secretary), phone: 64 3 3642987, email: human-ethics@canterbury.ac.nz

Appendix D: Information sheet for focus groups in Christchurch

College of Science

Department of Geography

University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x4842, Fax: + 64 364 6907

Email: jillian.frater@pg.canterbury.ac.nz



SECONDARY SCHOOL TRAVEL IN CHRISTCHURCH 2012

INFORMATION SHEET

The University of Canterbury, in conjunction with the Christchurch City Council, is conducting research into the daily travel of secondary school students in Christchurch. The information collected will be used by Christchurch City Council to inform future school travel planning and impacts for the city. It will also be used in additional projects by researchers at the University of Canterbury.

You are invited to participate in this research project.

The aim of this project is investigate the reasons why the number of secondary school students cycling to school has decreased in recent years.

Your involvement in this project will be to participate in a small group focus (discussion) group of 6-8 pupils. This will take no longer than one hour. You have the right to withdraw from the project at any time, and can withdraw any information provided without penalty.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of individual students will not be made public.

We also require that focus group participants respect the confidentiality of the views expressed by others in the groups.

All Ph.D.s are public documents and are available through the University of Canterbury library database.

To ensure anonymity and confidentiality, data will be stored at the University of Canterbury on a password-protected computer and in a locked filing cabinet.

The project is being carried out as a requirement for her Ph.D. in Geography by Jillian Frater under the supervision of Professor Simon Kingham, who can be contacted at +64 3 364 2907 x7936. He will be happy to discuss any concerns you may have about participation in the project.

The project has been reviewed *and approved* by the University of Canterbury Human Ethics Committee. It can be contacted via Lynda Griffioen (Secretary), phone: 64 3 3642987, email: human-ethics@canterbury.ac.nz

Appendix E: Information sheet for focus groups in Voorschoten

College of Science

Department of Geography

University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x4842, Fax: + 64 364 6907

Email: jillian.frater@pg.canterbury.ac.nz



SECONDARY SCHOOL TRAVEL – AN INTERNATIONAL COMPARISON INFORMATION SHEET

The University of Canterbury, in conjunction with the Christchurch City Council, is conducting research into the daily travel of secondary school students in Christchurch. The information collected will be used by Christchurch City Council to inform future school travel planning and impacts for the city. It will also be used in additional projects by researchers at the University of Canterbury.

You are invited to participate in this research project.

The aim of this project is investigate the reasons why the number of secondary school students cycling to school has decreased in recent years.

Your involvement in this project will be to participate in a small group focus (discussion) group of 6-8 pupils. This will take no longer than one hour. You have the right to withdraw from the project at any time, and can withdraw any information provided without penalty.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of individual students will not be made public.

We also require that focus group participants respect the confidentiality of the views expressed by others in the groups.

All Ph.D.s are public documents and are available through the University of Canterbury library database.

To ensure anonymity and confidentiality, data will be stored at the University of Canterbury on a password-protected computer and in a locked filing cabinet.

The project is being carried out as a requirement for her Ph.D. in Geography by Jillian Frater under the supervision of Professor Simon Kingham, who can be contacted at +64 3 364 2907 x7936. He will be happy to discuss any concerns you may have about participation in the project.

The project has been reviewed *and approved* by the University of Canterbury Human Ethics Committee. It can be contacted via Lynda Griffioen (Secretary), phone: 64 3 3642987, email: human-ethics@canterbury.ac.nz

Appendix F: Information sheet for parents in Christchurch

College of Science

Department of Geography

University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x4842, Fax: + 64 364 6907

Emails: jillian.frater@pg.canterbury.ac.nz

simon.kingham@canterbury.ac.nz

25 July 2012

SECONDARY SCHOOL TRAVEL IN CHRISTCHURCH 2012

INFORMATION SHEET

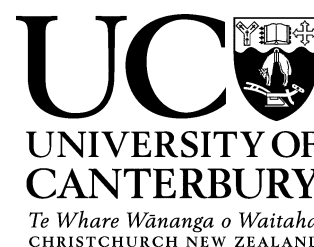
The University of Canterbury, New Zealand, in conjunction with the Christchurch City Council, is conducting research into the daily travel of secondary school students in Christchurch. In addition, research is being conducted into the daily travel of secondary school students in the Hague region of The Netherlands, to provide an international comparison.

The information collected will be used by Christchurch City Council to inform future school travel planning and impacts for the city. It will also be used in additional projects by researchers at the University of Canterbury.

We are inviting your child to participate in this research project.

The principal aim of this project is to investigate the reasons why the number of secondary school students cycling to school in Christchurch has decreased in recent years.

The results of the research will be available to Christchurch schools for use in their travel planning. Results may also be reported or published as papers at conferences attended by the researchers. A report on the results of the research for the school will be available for the school once the analysis is completed.



The research will include the completion of electronic surveys by students between the ages of 12 and 18. We estimate each survey will take between 15 and 20 minutes to complete. Focus groups of 6-8 pupils will be also be conducted and will take no longer than one hour each.

Students have the right to withdraw from the project at any time, and can withdraw any information provided without penalty.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of individual students will not be made public. To ensure anonymity and confidentiality, data will be stored at the University of Canterbury on a password protected computer and in a locked filing cabinet.

The project is being carried out by Jillian Frater as a requirement for her PhD in Geography under the supervision of Professor Simon Kingham. He can be contacted at +64 3 364 2907 x7936 and will be happy to discuss any concerns you may have about participation in the project. All Ph.D.s are public documents and are available through the University of Canterbury library database.

The project has been reviewed *and approved* by the University of Canterbury Human Ethics Committee. It can be contacted via Lynda Griffioen (Secretary), phone: 64 3 3642987, email: human-ethics@canterbury.ac.nz.

No action is required if you are happy for your child to participate in this research. If you do not wish for your child to participate in this research, please contact the researchers listed above.

Appendix G: Information sheet for parents in Voorschoten

College of Science

Department of Geography

University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x4842, Fax: + 64 364 6907

Emails: jillian.frater@pg.canterbury.ac.nz

simon.kingham@canterbury.ac.nz



SECONDARY SCHOOL TRAVEL IN CHRISTCHURCH 2012

INFORMATION SHEET

The University of Canterbury, New Zealand, in conjunction with the Christchurch City Council, is conducting research into the daily travel of secondary school students in Christchurch. In addition, research is being conducted into the daily travel of secondary school students in the Hague region of The Netherlands, to provide an international comparison.

The information collected will be used by Christchurch City Council to inform future school travel planning and impacts for the city. It will also be used in additional projects by researchers at the University of Canterbury.

We are inviting your child to participate in this research project.

The principal aim of this project is to investigate the reasons why the number of secondary school students cycling to school in Christchurch has decreased in recent years.

The results of the research will be available to Christchurch schools for use in their travel planning. Results may also be reported or published as papers at conferences attended by the researchers. A report on the results of the research for the school will be available for the school once the analysis is completed.

The research will include the completion of electronic surveys by students between the ages of 12 and 18. We estimate each survey will take between 15 and 20 minutes to complete. Focus groups of 6-8 pupils will be also be conducted and will take no longer than one hour each.

Students have the right to withdraw from the project at any time, and can withdraw any information provided without penalty.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of individual students will not be made public. To ensure anonymity and confidentiality, data will be stored at the University of Canterbury on a password protected computer and in a locked filing cabinet.

The project is being carried out by Jillian Frater as a requirement for her PhD in Geography under the supervision of Professor Simon Kingham. He can be contacted at +64 3 364 2907 x7936 and will be happy to discuss any concerns you may have about participation in the project. All Ph.D.s are public documents and are available through the University of Canterbury library database.

The project has been reviewed *and approved* by the University of Canterbury Human Ethics Committee. It can be contacted via Lynda Griffioen (Secretary), phone: 64 3 3642987, email: human-ethics@canterbury.ac.nz.

No action is required if you are happy for your child to participate in this research. If you do not wish for your child to participate in this research, please contact the researchers listed above.

Appendix H: Consent form for Board of Trustees of Schools in Christchurch

College of Science

Department of Geography

University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x7936, Fax: + 64 364 6907

Emails: jillian.frater@pg.canterbury.ac.nz

george.williams @pg.canterbury.ac.nz



24 July 2012

CONSENT FORM FOR BOARDS OF TRUSTEES

SECONDARY SCHOOL TRAVEL IN CHRISTCHURCH 2012

I have read and understood the description of the above-named project. On this basis I agree for our teachers and students to participate as subjects in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I understand also that I may at any time withdraw from the project.

I note that the project will be subject to review *and approval* by the University of Canterbury Human Ethics Committee. The Committee can be contacted via Lynda Griffioen (Secretary), phone: 64 3 3642987, email: human-ethics@canterbury.ac.nz

NAME (please print):

Signature:

Date:

Appendix I: Consent form for teachers in Christchurch

College of Science

Department of Geography

University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x7936, Fax: + 64 364 6907

Emails: jillian.frater@pg.canterbury.ac.nz

george.williams @pg.canterbury.ac.nz



24 July 2012

CONSENT FORM FOR SCHOOL STAFF

SECONDARY SCHOOL TRAVEL IN CHRISTCHURCH 2012

I have read and understood the description of the above-named project. On this basis I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided.

I note that the project has been reviewed *and approved* by the University of Canterbury Human Ethics Committee. The Committee can be contacted via Lynda Griffioen (Secretary), phone: 64 3 3642987, email: human-ethics@canterbury.ac.nz

NAME (please print):

Signature:

Date:

Appendix J: Assent form for students in Christchurch

College of Science

Department of Geography

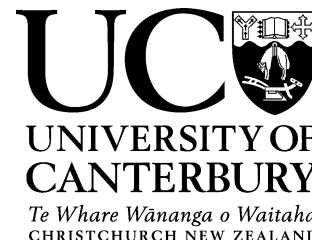
University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x7936, Fax: + 64 364 6907

Email: jillian.frater@pg.canterbury.ac.nz



13 Sept 2013

ASSENT FORM FOR STUDENTS TAKING PART IN FOCUS GROUPS

SECONDARY SCHOOL TRAVEL IN CHRISTCHURCH 2013

I have read and understood the description of the above-named project. On this basis I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided.

I note that the project has been reviewed *and approved* by the University of Canterbury Human Ethics Committee.

NAME (please print):

Signature:

Date:

Appendix K: Assent form for students in Voorschoten

College of Science

Department of Geography

University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x7936, Fax: + 64 364 6907

Email: jillian.frater@pg.canterbury.ac.nz



5 June 2013

ASSENT FORM FOR STUDENTS TAKING PART IN FOCUS GROUPS

SECONDARY SCHOOL TRAVEL IN CHRISTCHURCH 2013- AN INTERNATIONAL COMPARISON

I have read and understood the description of the above-named project. On this basis I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided.

I note that the project has been reviewed *and approved* by the University of Canterbury Human Ethics Committee.

NAME (please print):

Signature:

Date:

Appendix L: Consent form for parents in Voorschoten

College of Science

Department of Geography

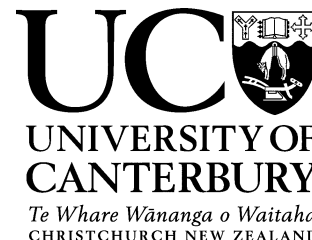
University of Canterbury,

Private Bag 4800

Christchurch, New Zealand.

Tel: +64 3 364 2907 x7936, Fax: + 64 364 6907

Emails: jillian.frater@pg.canterbury.ac.nz



31 May 2013

CONSENT FORM FOR PARENTS

SECONDARY SCHOOL TRAVEL – AN INTERNATIONAL COMPARISON

I have read and understood the description of the above-named project. On this basis I agree to my child participating as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I understand also that I may at any time withdraw my child from the project, including withdrawal of any information they have provided.

I note that the project has been reviewed *and approved* by the University of Canterbury Human Ethics Committee. The Committee can be contacted via Lynda Griffioen (Secretary), phone: 64 3 3642987, email: human-ethics@canterbury.ac.nz

NAME (please print):

Signature:

Date:

Appendix M: Interview questions for teachers in Christchurch

Approximately how many students are there in the different year groups at your school?

Approximately how many staff, including support staff?

Approximately what proportion of students at the school live within the school zone?

Where does the zone extend to? (I will look this up too)

Do many students cycle to your school? Approximately how many?

What facilities are provided for students who bring bicycles to school? E.g covered parking, lockers, showers, changing rooms

Do students use these facilities?

Is there a demand for more facilities?

What kind of uniform do students have?

If not many do cycle, why do you think this is?

If not many do cycle, how do students get to school in general?

Why do you think they choose these options?

Do a lot of students bring their own cars/motorbikes/motor scooters to school?

What provisions are made for students who bring cars/motorbikes/motor scooters to school? E.g parking, lockers.

Does your school have any rules/policies/requirements regarding bringing of vehicles to school and/or parking?

Has the number of students bringing cars/motorbikes/motor scooters to school changed much over the years? Has it changed much since the age to obtain a learner's licence changed from 15 to 16 in August 2011?

Does the school have any cycling clubs or teams? How many students in these teams? Do you think the cycling teams have any influence over whether or not students cycle to school?

Do many staff cycle to school or come by means other than private motor car?

Are transport choices discussed or taught at school? Any road safety instruction? If so, in what subject and how much?

Have there ever been any transport issues related to your school? If so, how were these resolved?

Any traffic accidents or injuries?

Do you foresee transport becoming an issue in the future in relation to your school?

Do you think there is any need to change the way students travel to and from your school? If so, are there any changes you would like to see to enable these changes to occur?

Appendix N: Survey

Christchurch Secondary School Travel Survey 2012

Please read the following note before completing the questionnaire.

NOTE: You are invited to participate in the **Christchurch Secondary School Travel Survey 2012** by completing the following questionnaire. The aim of the project is to obtain information on how secondary school students travel to school, the route taken by people who do cycle to school and attitudes to cycling.

The project is being carried out as research for their PhDs by George Williams and Jillian Frater, under the supervision of Prof. Simon Kingham who can be contacted at 364 2987 x7936. He will be pleased to discuss any concerns you may have about participation in the project.

The survey is anonymous, and you will not be identified as a participant without your consent. Even if contact information is provided, it will be collected and kept separately to answers provided in the survey.

You may withdraw your participation, including withdrawal of any information you have provided, up until the time your survey has been added to the others collected. Because it is anonymous, it cannot be retrieved after that. If you are filling out a paper copy of this survey, please note that it is the same as the e-survey and the same data is being gathered by both.

By completing the questionnaire it will be understood that you have consented to participate in the project, and that you consent to publication of the results of the project with the understanding that anonymity will be preserved.

Prizes: All students who complete the survey and provide a contact email will be eligible to win one of three \$50 vouchers for Ground Effect cycle clothing. The winners will be drawn at random from the completed surveys. Only one survey is permitted per student. It is expected that a total of approximately 2000 students will be surveyed.

Thank you for taking the time to help us with our research by completing this questionnaire.

Section 1: Please read all questions and instructions carefully

1. What is your gender?

Male

Female

2. Which year are you in at school?

9

11

13

3. Are you 16 years of age or older?

Yes

No - *skip to number 7*

4. Do you have a licence to drive a car or motorcycle?

Yes

No - *skip to number 7*

5. Choose the type of license(s) you have: (please choose all that apply)

A learner's licence to drive a car

A learner's licence to ride a motorcycle

A restricted licence to drive a car

A restricted licence to ride a motorcycle

A full licence to drive a car

A full licence to ride a motorcycle

Some other kind of vehicle licence - please specify.....

6. Which one of the following best applies to you: (please choose one only)

I don't own, and never have the use of, a car, motorcycle or moped

I can use someone else's car, motorcycle or moped whenever I want to

I can sometimes use someone else's car, motorcycle or moped

I have my own car, motorcycle or moped

7. Where do you travel from?

Please enter the name of the street you live on and then the next nearest street to your house.

My street (e.g. Colombo) _____

The next nearest street to my house (e.g. Bealey) _____

8. How did you usually get to school this year? (please choose one only)

Car (passenger)

Car (drive yourself)

Bike

Skate, rollerblade or scooter

Motorbike or motor scooter

Walk

Bus

Other _____

9. Only answer this question if you chose 'bike' in question 8, otherwise skip to number 10

Thinking about the route you take when you bike to school, are there any specific parts of it that put you off biking because they are dangerous, difficult or unpleasant or because they slow you down?

Yes - *skip to number 13*

No - *skip to number 14*

10. Have you ever biked to school (at any school)?

Yes

No

11. Please choose the reason(s) you did not usually bike to school this year (please choose all that apply).

It's too far

I have too much to carry or other places to go before/after school

I think it is too dangerous

I don't have a bike/nice bike

I've never really ridden on the road before

I'm close enough to walk, skate, scooter or roller blade

It's too cold/wet/windy

I don't like the traffic

I need some proper training

The bike sheds aren't very good or they are too full

Other _____

12. Only answer these questions if you chose 'I don't like the traffic' or 'I think it is too dangerous' for question 11, otherwise skip to number 16

Are there parts of your route to school that put you off biking or do Christchurch roads and traffic in general put you off biking? (please choose one only)

Parts of my route to school put me off biking

Christchurch in general puts me off biking - *skip to number 16*

Both

13. Mark the attached map to show each location/feature that puts you off biking to school and tick the reasons as listed - instructions are on the map. Please do not include temporary changes like road works.

14. Only answer this question if you chose bike in question 8, otherwise skip to number 16

Thinking about the route you take when you ride to school, are there any parts of that route that encourage you to bike because they are safer, easier or nicer or because they save you time?

Yes

No - *skip to number 16*

15. Mark the attached map to show each location/feature that encourages you to bike to school and tick the reasons as listed - instructions are on the map.

16. Has the way you usually travel to school (e.g. car, bike, bus etc) changed as a result of the earthquakes?

Yes/No

For the questions 2-17, please circle one number for each question or part of a question, indicating your response.

2 My parents/caregivers think I should ride a bicycle to school.

1 2 3 4 5 6 7

Disagree

Agree

3 My friends think I should ride a bicycle to school.

1 2 3 4 5 6 7

Disagree

Agree

4 My parents/caregivers would:

1 2 3 4 5 6 7

Disapprove of
me riding a
bicycle to
school

Approve of me riding a
bicycle to school

5 My friends would:

1 2 3 4 5 6 7

Disapprove of
me riding a
bicycle to
school

Approve of me riding a
bicycle to school

6 My parents/caregivers think I:

- 1 2 3 4 5 6 7
- Should ride a Should not ride a
bicycle to bicycle to school
school
- 7 My friends think I:
- 1 2 3 4 5 6 7
- Should ride a Should not ride a bicycle
bicycle to to school
school
- 8 How much personal control do you yourself have over whether or not you ride a
bicycle to school?
- 1 2 3 4 5 6 7
- No Complete Control
Control
- 9 I feel in control of whether I ride a bicycle to school.
- 1 2 3 4 5 6 7
- No Complete Control
Control
- 10 How often do you intend to ride a bicycle to school?
- 3 -2 -1 0 1 2 3
- Never Frequently
- 11 I want to regularly ride a bicycle to school.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Definitely
do not

Definitely do

17 Think about the last two weeks. How many times did you cycle to school? (Circle one)

Never Almost never Sometimes Almost every day Every day

Imagine the following situations:

18 A friend invites you to a party on a Saturday afternoon. The party starts at 1pm and finishes at 4pm. Your friend lives 3km from your house. There are no hills between your house and your friend's house. You have a bicycle and are fit and healthy. The weather is good. Someone in your house offers you a ride in their car.

a) How willing would you be to accept the ride?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Very willing

Not very willing

b) How willing would you be to tell them “no thanks”?

1 2 3 4 5 6 7

Very willing

Not very willing

c) **How willing would you be to ride a bicycle to your friend's house?**

1 2 3 4 5 6 7

Very willing

Not very willing

19 It is summer and it is light till 9pm. A friend invites you over to their house for a few hours in the afternoon. Your friend lives 3km from your house. There are no hills between your house and your friend's house. You have a bicycle and are fit and healthy. Someone in your house offers you a ride in their car.

a) How willing would you be to accept the ride?

1 2 3 4 5 6 7

Very willing

Not very willing

b) How willing would you be to tell them “no thanks”?

1 2 3 4 5 6 7

Very willing

Not very willing

c) How willing would you be to ride a bicycle to your friend's house?

1 2 3 4 5 6 7

Very willing

Not very willing

The next two questions are about what we think about different types of people. For example, if we think about a typical person who is a famous singer, we may think of someone who is good-looking and has lots of money. If we think about someone who is a typical grandmother, we may think of someone who is small and has grey hair. But we all know that not all famous singers are good-looking and not that all grandmothers have grey hair.

20 Imagine you see someone from your year group cycling to school. Complete the following sentence:

In general, I think this person is: (Tick one box for each description)

	1 Not at all	2	3	4	5	6	7 Extremel y
Smart							
Popular							
Immature (childlike)							
Cool							
Self-confident							
Independent (makes their own decisions)							
Unattractive (unappealing)							
Dull (not interesting)							

Considerate (thinks of others)							
Fit							
Lazy							
Doesn't care what people think of them							
Doesn't care about their safety							
Cares about the environment							
(If they are girl cyclists)- Feminine/ladylike							

21 How favourable (positive) is your impression of the type of person your age that cycles to school? (Draw a vertical line on the following scale to answer this question.)

0	10	20	30	40	50	60	70	80	90	100
---	----	----	----	----	----	----	----	----	----	-----

(Extremely unfavourable)

(Extremely favourable)

22 How similar are you to the type of person your age who cycles to school?

	1	2	3	4	5	6	7	
Very similar								Not at all similar

23 Please give the name of the class you are in at the moment.

If you are not in a class, please state the name of the period or break.

24 Prizes and Focus groups

If you would like to be eligible to win one of three prizes of \$50 vouchers for Ground Effect cycle clothing or if you would be willing to be part of a small group to discuss how you travel to school please tick the appropriate boxes and write your email address below so we can contact you.

I would like to be eligible to win a prize ☐

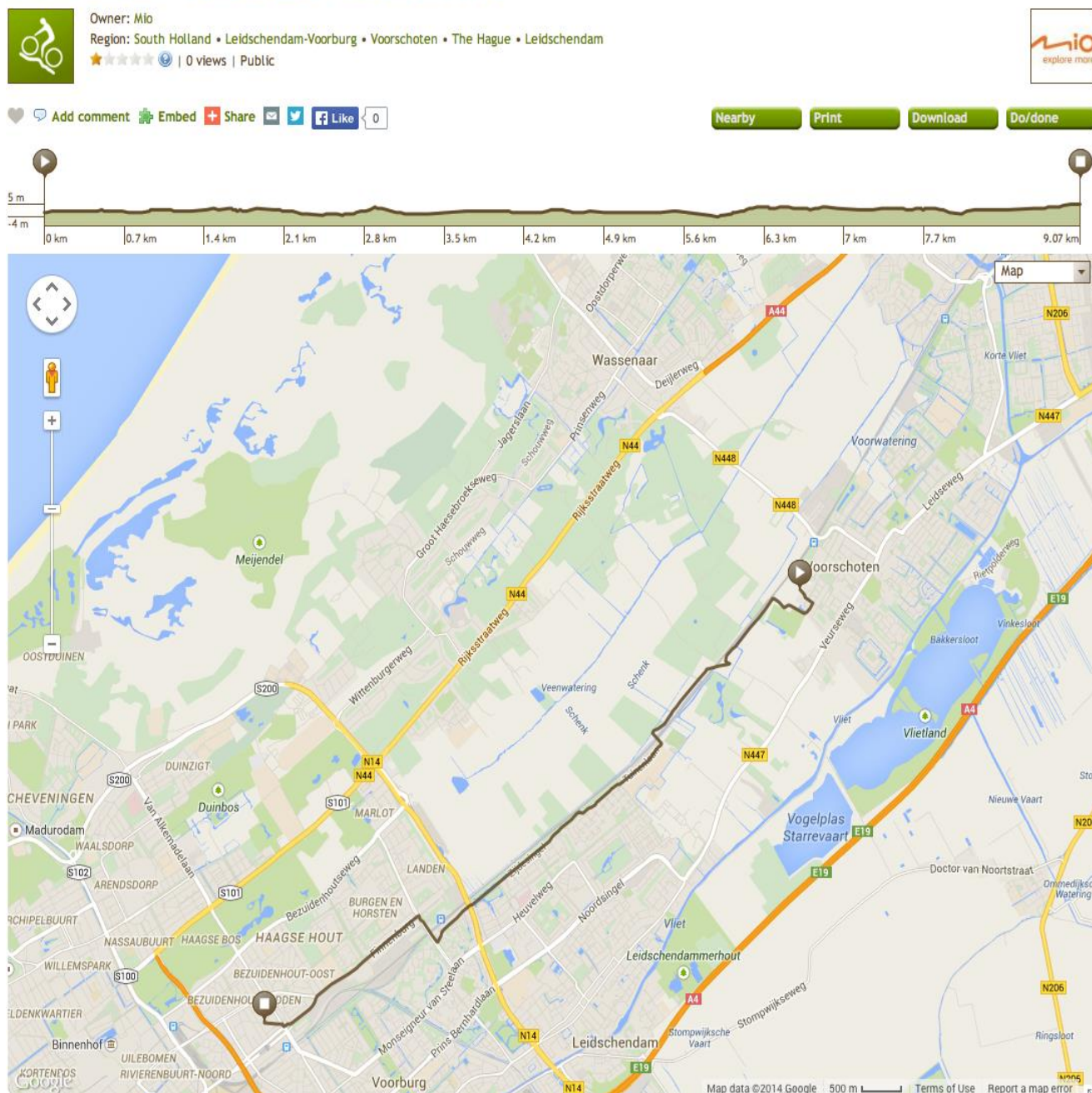
I would be willing to be part of a focus group ☐

Email address

Thank you for helping us with our research by taking the time to fill in this questionnaire

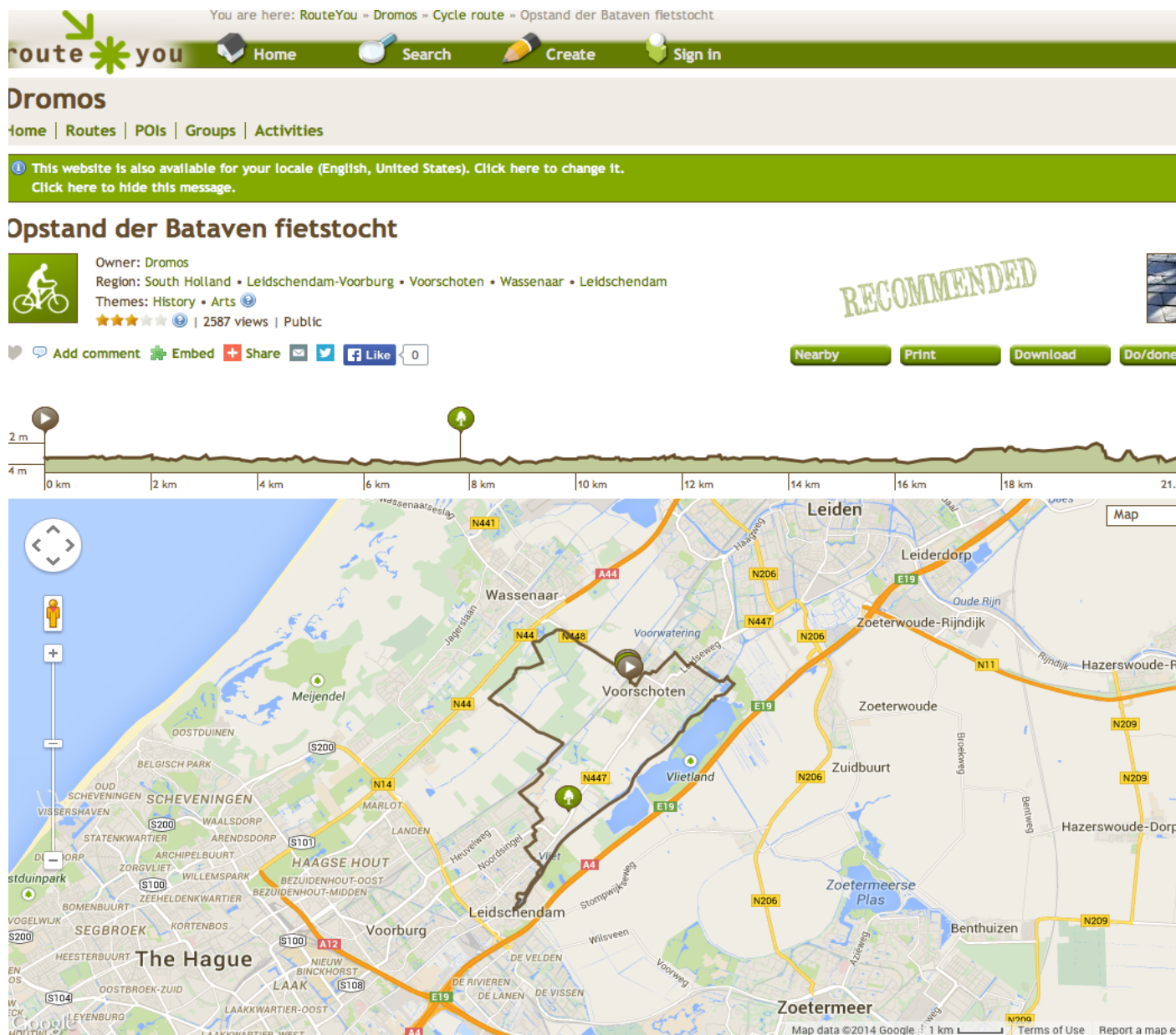
Appendix O: Cycle trails - Leidschendam to Voorburg

Leidschendam-Voorburg_20140329_190112



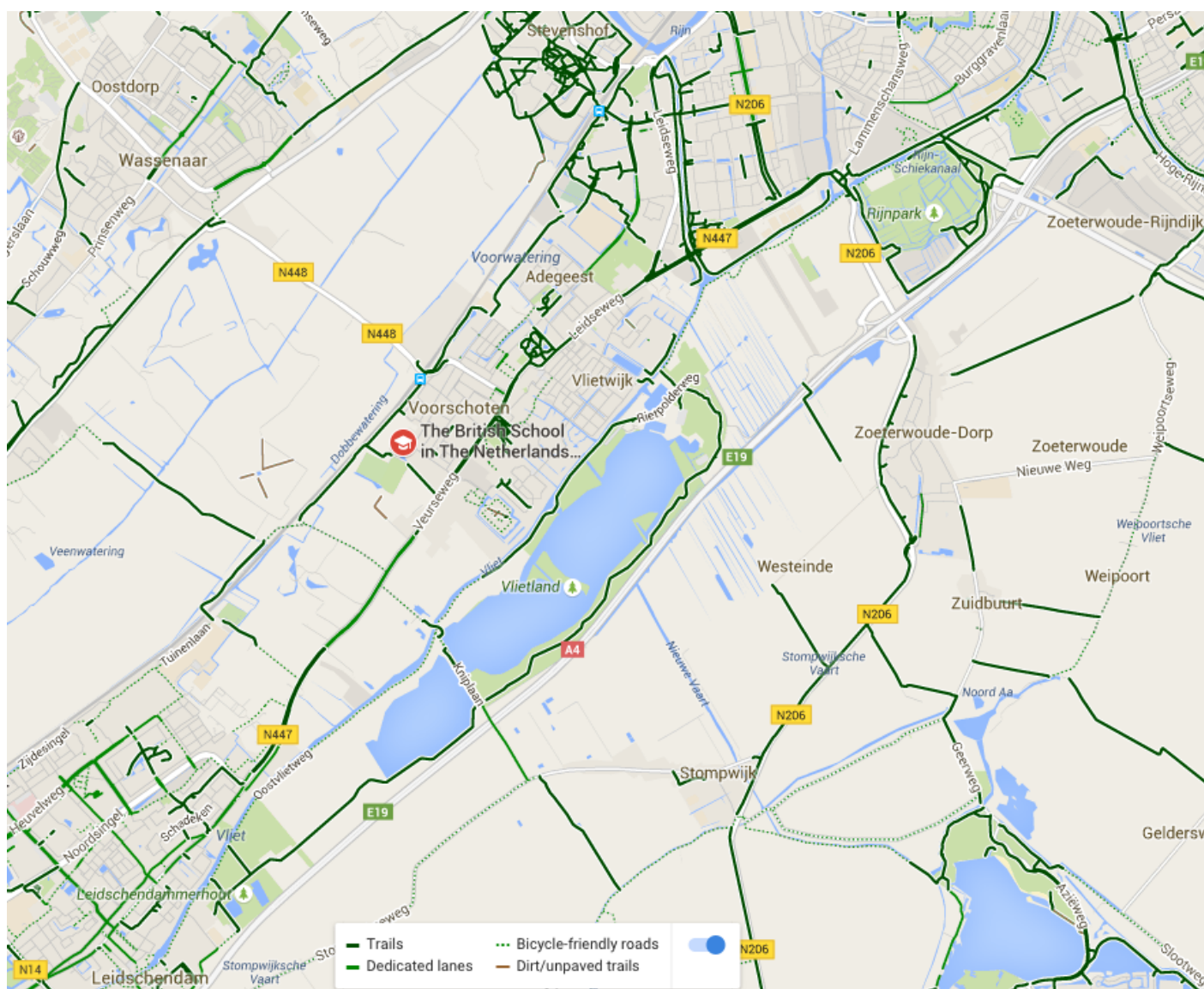
Source: <http://www.routeyou.com/en-nl/location/bike/47305398/biking-in-leidschendam-voorburg-overview-of-all-cycling-routes>

Appendix P: Cycle trails connecting Voorschoten to the neighbouring towns of Wassenaar and Leidschendam.



Source: <http://www.routeyou.com/nl-nl/route/view/59738/fietsroute/opstand-der-bataven-fietstocht>

Appendix Q: Other cycle trails in the vicinity of The British School in The Netherlands



Source:

<https://www.google.co.nz/maps/place/Voorschoten,+Netherlands/@52.1255165,4.4356863,14z/data=!3m1!4b1!4m2!3m1!1s0x47c5c7c1a58d649b:0xe44d5e41bcf32264!5m1!1e3>

Appendix R: Images shown to students in focus groups.

9



10



11



12



13



14



15



16



17



18



19



20



21

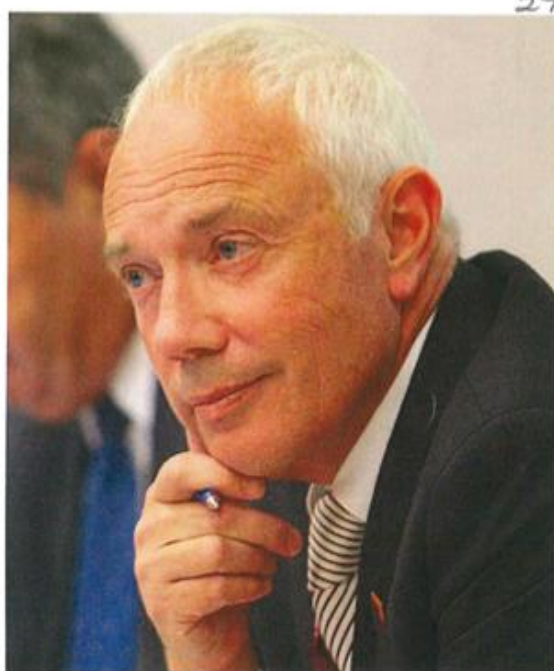
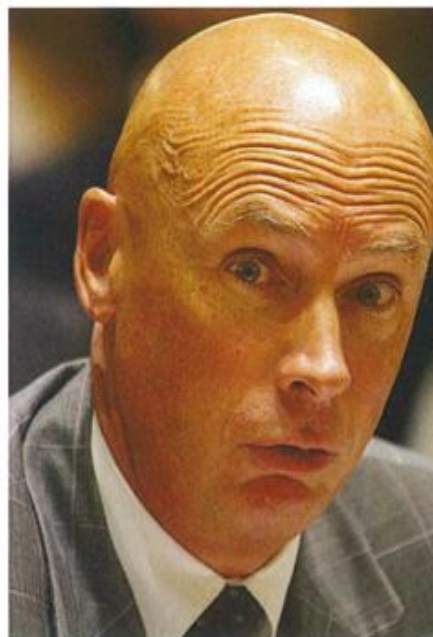


22



23.





References

- Abrahamse, W., Steg, L., Vlek, C., & Gifford, R. (2009). Factors influencing car use for commuting and the intention to reduce it: A question of self-interest or morality? *Transportation Research Part F - Traffic Psychology and Behaviour* 12(4), 317-324.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.
- Aldous, J. (1983). *Family careers: Developmental change in families*. New York: Wiley.
- Alexander Ballard and Associates. (2005). How can local authorities stimulate & support behavioural change in response to climate change? *A report for Hampshire County Council undertaken as part of the ESPACE project September 2004 - May 2005 Volume 1: Main report*.
- Allender, S., Cowburn, G., & Foster, C. (2006). Understanding participation in sport and physical activity among children and adults: A review of qualitative studies. *Health education research*, 21(6), 826-835.
- Anable, J. (2005). 'Complacent Car Addicts' or 'Aspiring Environmentalists'? Identifying travel behaviour segments using attitude theory. *Transport Policy*, 12(1), 65-78.
- Appleyard, B. (2003). *Safe Routes to Schools: Planning Safe Routes to School*. Retrieved from <http://www.saferoutestoschools.org/Pressroom/PlanningSRTS.shtml> [Accessed 7/12/14]
- Armitage, C. J. (2005). Can the theory of planned behavior predict the maintenance of physical activity? *Health Psychology*, 24(3), 235-245.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British journal of social psychology*, 40(4), 471-499.
- Australian Government. (2005). Evaluation of the Australian Travel Smart Projects in the ACT, South Australia, Victoria and Western Australian, 2001-2005. Report prepared for the Australian Greenhouse Office.
- Bamberg, S., Ajzen, I., & Schmidt, P. (2003). Choice of Travel Mode in the Theory of Planned Behavior: The Roles of Past Behavior, Habit, and Reasoned Action. *Basic and Applied Social Psychology*, 25(3), 175-187.
- Bamberg, S., & Schmidt, P. (2003). Incentives, morality, or habit? Predicting students car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and behavior*, 35(2), 264- 285.
- Banks, M. (2001). *Visual methods in social research*. London: Sage.
- Bassett, D. R., Pucher, J., Buehler, R., Thompson, D. L., & Crouter, S. E. (2008). Walking, cycling, and obesity rates in Europe, North America, and Australia. *J Phys Act Health*, 5(6), 795-814.
- Baxter, S. D., Thompson, W. O., Davis, H. C., & Johnson, M. H. (1997). Impact of gender, ethnicity, meal component, and time interval between eating and reporting on accuracy of fourth-graders' self-reports of school lunch. *Journal of the American Dietetic Association*, 97(11), 1293-1298.
- Bean, C. E. (2006). *Walkable Auckland? Transport cultures and socialities in the autocentric city*. . Master of Science in Geography, University of Auckland, Auckland.
- Behm-Morawitz, E., & Mastro, D. E. (2008). Mean girls? The influence of gender portrayals in teen movies on emerging adults' gender-based attitudes and beliefs. *Journalism & Mass Communication Quarterly*, 85(1), 131-146.
- Bell, A., Garrard, J., & Swinburn, B. (2005). Active transport to work in Australia: Is it all downhill from here? *Asia-Pacific journal of public health/Asia-Pacific Academic Consortium for Public Health*, 18(1), 62-68.
- Betancourt, H., & Lopez, S. R. (1993). The study of culture, ethnicity, and race in American psychology. *American Psychologist*, 48(6), 629.
- Billante, V. (2010). Health promotion and sustainability through environmental design: A guide for planning. In Christchurch City Council (Ed.). Christchurch.

- Bindon, J., Headley, E., Rissel, C., & Wade, V. (2009). Improving the health and wellbeing of an urban Aboriginal men's group through a cycling promotion program. *Aboriginal and Islander Health Worker Journal*, 33(4), 3.
- Birk, M., & Geller, R. (2006). *Bridging the gaps: How quality and quantity of a connected bikeway network correlates with increasing bicycle use*. Paper presented at the Transportation Research Board 85th Annual Meeting, Washington, DC, USA.
- Black, C., Collins, A., & Snell, M. (2001). Encouraging walking: The case of journey-to-school trips in compact urban areas. *Urban Studies*, 38(7), 1121-1141.
- Boreham, C., & Riddoch, C. (2001). The physical activity, fitness and health of children. *Journal of sports sciences*, 19(12), 915-929.
- Bosco, F. J., & Herman, T. (2009). Focus groups as collaborative research performances. In D. DeLyser, S. Herbert, S. Aitken, M. Crang & L. McDowell (Eds.), *The SAGE handbook of qualitative geography* (pp. 193-207). London: Sage.
- Bradshaw, R., & Jones, P. (2000). The family and the school run: What would make a real difference? In Transportation Research Board (Ed.). Berkshire, UK: AA Foundation for Road Safety Research.
- Braza, M., Shoemaker, W., & Seeley, A. (2004). Neighborhood design and rates of walking and biking to elementary school in 34 California communities. *American Journal of Health Promotion*, 19(2), 128-136.
- Brown, S. C., Mason, C. A., Perrino, T., Lombard, J. L., Martinez, F., Plater-Zyberk, E., . . . Szapocznik, J. (2008). Built environment and physical functioning in Hispanic elders: The role of "eyes on the street". *Environmental Health Perspectives*, 116(10), 1300-1307.
- Brunekreef, B., & Holgate, S. T. (2002). Air pollution and health. *Lancet*, 360(9341), 1233-1242.
- Bruntlett, C., & Bruntlett, M. (2014). *Promoting the bicycle culture you want*. Paper presented at the 2WalkandCycle Conference, Nelson, New Zealand.
- Bukatko, D. (2008). *Child and Adolescent Development - a Chronological Approach*. Boston, USA: Houghton Mifflin Company.
- Buliung, R. N., Mitra, R., & Faulkner, G. (2009). Active school transportation in the Greater Toronto Area, Canada: An exploration of trends in space and time (1986-2006). *Preventive medicine*, 48(6), 507-512.
- Cairns, C., Sloman, L., Newson, C., Anable, J., Kirkbride, A., & Goodwin, P. (2004). Smarter Choices: changing the way we travel. Final report of the research project: 'The influence of soft factor interventions on travel demand'. In Department for Transport (Ed.). London.
- Callander, B. A., Maskell, K., & Mintzer, I. M. (1993). Basic science of climate change. *The Lancet*, 342(8878), 1027-1031.
- Cameron, I., Lyons, T. J., & Kenworthy, J. R. (2004). Trends in vehicle kilometres of travel in world cities, 1960-1990: Underlying drivers and policy responses. *Transport Policy*, 11(3), 287-298.
- Carlin, J. B., Stevenson, M. R., Roberts, I., Bennett, C. M., Gelman, A., & Nolan, T. (1997). Walking to school and traffic exposure in Australian children. *Australian and New Zealand journal of public health*, 21(3), 286-292.
- Carver, A., Watson, B., Shaw, B., & Hillman, M. (2013). A comparison study of children's independent mobility in England and Australia. [Article]. *Children's Geographies*, 11(4), 461-475. doi: 10.1080/14733285.2013.812303
- Centers for Disease Control and Prevention. (2002). Barriers to children walking and biking to school--United States, 1999. *JAMA*, 288, 1343-1344.
- Centers for Disease Control and Prevention. (2005). Barriers to children walking to school--United States, 2004. *JAMA*, 294, 2160-2162.
- Cervero, R., Caldwell, B., & Cuellar, J. (2013). Bike-and-ride: Build it and they will come. *Journal of Public Transportation*, 16(4), 5.
- Cervero, R., & Kockelman, K. (1997). Travel demand and the 3Ds: Density, diversity, and design. *Transportation Research Part D: Transport and Environment*, 2(3), 199-219.

- Cho, G., Rodríguez, D. A., & Khattak, A. J. (2009). The role of the built environment in explaining relationships between perceived and actual pedestrian and bicyclist safety. *Accident Analysis & Prevention*, 41(4), 692-702.
- Christchurch City Council. (2013). *Traffic Count Data*. Retrieved from <http://www.ccc.govt.nz/CCC.Web.TrafficCount/cityleisure/projectstoimprovechristchurch/transport/trafficcount/volumecount.aspx> [Accessed 24/6/2015]
- Christchurch City Council. (2014). *Cycling*. Retrieved from <http://www.ccc.govt.nz/CITYLEISURE/gettingaround/cycling/index.aspx> [Accessed 10/12/2014]
- Christchurch City Council. (2015). *Cycle Safe Programme*. Retrieved from <http://www.ccc.govt.nz/transport/cycling/skills-programme/cycle-safe-programme/> [Accessed 29/07/2015]
- Christchurch Cycle Safety Committee, & Transit New Zealand. (1991). Cycle use and collisions in Christchurch *TNZ Research Report No. 7*. Wellington, N.Z: Transit New Zealand.
- Clifton, K. J. (2001). *Mobility strategies and provisioning activities of low-income households in Austin, Texas*. University of Texas at Austin, Texas, Community and Regional Planning Program.
- Clifton, K. J., & Handy, S. L. (2001). *Qualitative methods in travel behaviour research*. Paper presented at the International Conference on Transport Survey Quality and Innovation, Kruger National Park, South Africa.
- Conner, M., & Norman, P. (Eds.). (2005). *Predicting health behaviour*. Berkshire, England: Open University Press.
- Conner, M., & Sparks, S. (2005). The Theory of Planned Behaviour and Health Behaviour. In M. Conner & P. Norman (Eds.), *Predicting Health Behaviour* (pp. 170-222). Berkshire, UK: Open University Press.
- Conradson, D. (2005). Focus groups. In R. Flowerdew & D. Martin (Eds.), *Methods in human geography: A guide for students doing a research project*. New York: Prentice Hall.
- Cooper, A. R., Page, A. S., Foster, L. J., & Qahwaji, D. (2003). Commuting to school: are children who walk more physically active? *American journal of preventive medicine*, 25(4), 273-276.
- Copenhagenize EU Design Company. (2014). *The Copenhagenize Index of Bicycle Friendly Cities*. Retrieved from <http://copenhagenize.eu/index/index.html> [Accessed 12/12/2014]
- Cyclechic Ltd. (2015). *Cyclechic - helping you cycle in style*. Retrieved from <https://www.cyclechic.co.uk/shop/helmets/all> [Accessed 24/08/2015]
- Dahlgren, G., & Whitehead, M. (1992). *Policies and strategies to promote equity in health*. Copenhagen: OMS.
- Darnton, A. (2008). Reference Report: An overview of behaviour change models and their uses: Centre for Sustainable Development, University of Westminster.
- Davis, B., Dutzik, T., & Baxandall, P. (2012). *Transportation and the New Generation - Why Young People are Driving Less and What It Means for Transportation Policy*. Santa Barbara, California: Frontier Group and U.S. Public Interest Research Group Education Fund.
- Davison, K., Werder, L., & Lawson, T. (2008). Children's active commuting to school: Current knowledge and future directions. *Preventive Chronic Diseases* 5 (3). *Preventing Chronic Disease*, 5(3):A 100.
- De Bruijn, G. J., Kremers, S. P., Singh, A., Van den Putte, B., & Van Mechelen, W. (2009). Adult active transportation: Adding habit strength to the theory of planned behavior. *American Journal of Preventive Medicine*, 36(3), 189-194.
- De Bruijn, G. J., Kremers, S. P. J., Schaalma, H., Van Mechelen, W., & Brug, J. (2005). Determinants of adolescent bicycle use for transportation and snacking behavior. *Preventive medicine*, 40(6), 658-667.

- Delaney, A., Newstead, S., & Corben, B. (2004). *Outcome evaluation of the effectiveness of the Safe Routes to Schools program*. Victoria, Australia: Accident Research Centre, Monash University.
- Den Besten, O. (2010). Negotiating children's outdoor spatial freedom: Portraits of three Parisian families. In L. Holt (Ed.), *Geographies of children, youth and families: An international perspective* (pp. 136-150). New York, USA: Routledge.
- Dickinson, J. E., Kingham, S., Copsey, S., & Hougie, D. J. P. (2003). Employer travel plans, cycling and gender: Will travel plan measures improve the outlook for cycling to work in the UK? *Transportation Research Part D: Transport and Environment*, 8(1), 53-67.
- Dion, K. K. (1973). Young children's stereotyping of facial attractiveness. *Developmental Psychology*, 9(2), 183-188. doi: 10.1037/h0035083
- Donald, I. J., Cooper, S. R., & Conchie, S. M. (2014). An extended theory of planned behaviour model of the psychological factors affecting commuters' transport mode use. *Journal of Environmental Psychology*, 40(0), 39-48.
- Dowling, R. (2000). Cultures of mothering and car use in suburban Sydney: A preliminary investigation. *Geoforum*, 31(3), 345-353.
- Elvik, R. (2000). How much do road accidents cost the national economy? *Accident Analysis & Prevention*, 32(6), 849-851.
- Emond, C. R., & Handy, S. L. (2012). Factors associated with bicycling to high school: Insights from Davis, CA. *Journal of Transport Geography*, 20, 71-79. doi: 10.1016/j.jtrangeo.2011.07.008
- Erikson, E. H. (1980). *Identity and the life cycle*. New York; London: Norton.
- Erikson, E. H. (1982). *The life cycle completed: A review*. New York: Norton.
- Eriksson, L., & Forward, S. E. (2011). Is the intention to travel in a pro-environmental manner and the intention to use the car determined by different factors? *Transportation Research Part D: Transport and Environment*, 16(5), 372-376.
- Evenson, K. R., Huston, S. L., McMillen, B. J., Bors, P., & Ward, D. S. (2003). Statewide prevalence and correlates of walking and bicycling to school. *Archives of Pediatrics & Adolescent Medicine*, 157(9), 887-892.
- Fagan, J. (2014, 15 June). Cyclists go head-to-head over safety, *Sunday Star Times*, p. 11.
- Fishbein, M. (1979). *A theory of reasoned action: Some applications and implications*. Paper presented at the Nebraska Symposium on Motivation, Nebraska, USA.
- Fishbein, M. (2000). The role of theory in HIV prevention. *AIDS care*, 12(3), 273-278.
- Fisher, G., Kjellstrom, T., Kingham, S., Hales, S., & Shrestha, R. (2007). *Health and Air Pollution in New Zealand*. Wellington, New Zealand.
- Flay, B. R., Snyder, F., & Petraitis, J. (2009). The theory of triadic influence. *Emerging theories in health promotion practice and research*, 2, 451-510.
- Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among US adults, 1999-2008. *JAMA: The Journal of the American Medical Association*, 303(3), 235.
- Forward, S. (2000). *The prediction of travel behaviour using the theory of planned behaviour*. Paper presented at the International Conference of Traffic and Transport Psychology, Bern, Switzerland.
- Forward, S. (2009). The theory of planned behaviour: The role of descriptive norms and past behaviour in the prediction of drivers' intentions to violate. *Transportation Research Part F: Traffic Psychology and Behaviour*, 12(3), 198-207.
- Forward, S. (2014). Exploring people's willingness to bike using a combination of the theory of planned behavioural and the transtheoretical model. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology*, 64(3), 151-159.
- Fowler, F. J. (2009). *Survey research methods*. Thousand Oaks: Sage Publications.
- Freeman, C., & Tranter, P. J. (2010). *Children and their urban environment: changing worlds*. London: Earthscan.

- Furnham, A. (1986). Response bias, social desirability and dissimulation. *Personality and Individual Differences*, 7(3), 385-400. doi: [http://dx.doi.org/10.1016/0191-8869\(86\)90014-0](http://dx.doi.org/10.1016/0191-8869(86)90014-0)
- Gallagher, M. (2013). Rethinking participatory methods in children's geographies. In L. Van Blerk & M. Kesby (Eds.), *Doing children's geographies: Methodological issues in research with young people* (pp. 84-97). New York, USA: Routledge.
- Garrard, J. (2003). Healthy revolutions: Promoting cycling among women. *Health Promotion Journal of Australia*, 14(3), 213-215.
- Garrard, J., Crawford, S., & Hakman, N. (2006). Revolutions for Women: Increasing women's participation in cycling. In Department for Victorian Communities Sport and Recreation (Ed.), (pp. 78). Melbourne, Australia: Deakin University.
- Gatersleben, B., & Haddad, H. (2010). Who is the typical bicyclist? *Transportation Research Part F: Traffic Psychology and Behaviour*, 13(1), 41-48.
- Gerrard, M., Gibbons, F. X., Reis-Bergan, M., Trudeau, L., Vande Lune, L. S., & Buunk, B. (2002). Inhibitory effects of drinker and non-drinker prototypes on adolescent alcohol consumption. *Health Psychology*, 21(6), 601-609.
- Gibbons, F. X., Gerrard, M., Blanton, H., & Russell, D. W. (1998). Reasoned action and social reaction: Willingness and intention as independent predictors of health risk. *Journal of personality and social psychology*, 74(5), 1164-1180.
- Gibbons, F. X., Gerrard, M., Lane, D., Suls, J., & Wallston, K. (2003). A social reaction model of adolescent health risk. *Social psychological foundations of health and illness*, 107-136.
- Giles-Corti, B., & Donovan, R. J. (2003). Relative influences of individual, social environmental, and physical environmental correlates of walking. *American journal of public health*, 93(9), 1583-1589.
- Giles-Corti, B., Timperio, A., Bull, F., & Pikora, T. (2005). Understanding physical activity environmental correlates: increased specificity for ecological models. *Exercise and sport sciences reviews*, 33(4), 175-181.
- Glanz, K., & Sallis, J. F. (2006). The role of built environments in physical activity, eating, and obesity in childhood. *The future of children*, 16(1), 89-108.
- Gliem, J. A., & Gliem, R. R. (2003). *Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales*. Paper presented at the Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education, Columbus, Ohio, USA.
- Goodwin, P., & Van Dender, K. (2013). 'Peak Car' — Themes and Issues. [Article]. *Transport Reviews*, 33(3), 243-254.
- Gortmaker, S. L., Peterson, K., Wiecha, J., Sobol, A. M., Dixit, S., Fox, M. K., & Laird, N. (1999). Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. *Archives of pediatrics & adolescent medicine*, 153(4), 409-418.
- Green, J., Steinbach, R., & Datta, J. (2012). The travelling citizen: Emergent discourses of moral mobility in a study of cycling in London. *Sociology*, 46(2), 272-289.
- Gregory, D., Johnston, R., Pratt, G., Watts, M., & Whatmore, S. (2011). *The dictionary of human geography*. New Jersey, USA: John Wiley & Sons.
- Grize, L., Bringolf-Isler, B., Martin, E., & Braun-Fahrlander, C. (2010). Trend in active transportation to school among Swiss school children and its associated factors: Three cross-sectional surveys 1994, 2000 and 2005. *International Journal of Behavioral Nutrition and Physical Activity*, 28(7), 1-8.
- Gummesson, L., Jonsson, I., & Conner, M. (1997). Predicting intentions and behaviour of Swedish 10-16 year-olds at breakfast. *Food Quality and Preference*, 8(4), 297-306.
- Gutin, B., & Manos, T. M. (1993). Physical Activity in the Prevention of Childhood Obesity. *Annals of the New York Academy of Sciences*, 699(1), 115-126. doi: 10.1111/j.1749-6632.1993.tb18843.x

- Hamilton, D. L., & Uhles, A. N. (2000). Stereotypes. In A. E. Kazdin (Ed.), *Encyclopedia of psychology* (Vol. 7, pp. 466-470). Oxford, UK: American Psychological Association, Oxford University Press.
- Harland, P., Staats, H., & Wilke, H. A. M. (1999). Explaining Pro-environmental Intention and Behavior by Personal Norms and the Theory of Planned Behavior. *Journal of Applied Social Psychology*, 29(12), 2505-2528.
- Harrison, J., Kjellander, S., Komolov, P., Loza, L., & Shah, R. (2012). The Bike Kitchen business plan. Vancouver: University of British Columbia.
- Hart, R. (1979). *Children's experience of place*. Irvington, New York: John Wiley & Sons Inc.
- Hay, I. (2010). *Qualitative research methods in human geography*. Oxford, UK: Oxford University Press.
- Hayes, N. (2000). *Doing psychological research : gathering and analysing data*. Buckingham ; Philadelphia, PA: Open University Press.
- Heinen, E., Maat, K., & Wee, B. V. (2011). The role of attitudes toward characteristics of bicycle commuting on the choice to cycle to work over various distances. *Transportation Research Part D: Transport and Environment*, 16(2), 102-109.
- Hillman, M., Adams, J., & Whitelegg, J. (1990). *One False Move: A Study of Children's Independent Mobility*. London, UK: Policy Studies Institute.
- Hinde, S., & Dixon, J. (2005). Changing the obesogenic environment: insights from a cultural economy of car reliance. *Transportation Research Part D: Transport and Environment*, 10(1), 31-53.
- Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS medicine*, 7(7), 859.
- Horspool, B. (2006). Tempting Teenagers to Cycle - Cycling is for everyone. NZ Science, Mathematics and Technology Teacher Fellowship 2006: Royal Society of New Zealand & North Shore City.
- Horton, D. (2007). Fear of cycling. In D. Horton, P. Rosen & P. Cox (Eds.), *Cycling and society* (pp. 133-152). Aldershot: Ashgate.
- Hövding Sverige AB. (2015). *Hövding - Airbag for cyclists*. Retrieved from www.hovding.com [Accessed 24/08/2015]
- Hunter, F. T., & Youniss, J. (1982). Changes in functions of three relations during adolescence. *Developmental Psychology*, 18(6), 806-811.
- Jacobs, J. E., & Eccles, J. S. (1992). The impact of mothers' gender-role stereotypic beliefs on mothers' and children's ability perceptions. *Journal of personality and social psychology*, 63(6), 932.
- Jacobsen, P. L. (2003). Safety in numbers: More walkers and bicyclists, safer walking and bicycling. *Injury Prevention*, 9, 205-209.
- Jakob, A., Craig, J. L., & Fisher, G. (2006). Transport cost analysis: A case study of the total costs of private and public transport in Auckland. *Environmental Science & Policy*, 9(1), 55-66.
- Johansson, K., Hasselberg, M., & Laflamme, L. (2010). Young adolescents' independent mobility, related factors and association with transport to school. A cross-sectional study. *BMC Public Health*.
- Johansson, M. (2005). *Childhood influences on Adult Travel Mode Choice*. Paper presented at the International Conference of Traffic and Transport Psychology, Nottingham, England.
- Kahneman, D. (2002). Maps of bounded rationality: A perspective on intuitive judgment and choice. *Nobel prize lecture*, 8, 351-401.
- Kerr, J., Rosenberg, D., Sallis, J. F., Saelens, B. E., Frank, L. D., & Conway, T. L. (2006). Active commuting to school: Associations with environment and parental concerns. *Medicine and science in sports and exercise*, 38(4), 787-794.
- Kingham, S., Taylor, K., & Koorey, G. (2011). *Assessment of the type of cycling infrastructure required to attract new cyclists. Research report 449*. (0478380186). Wellington: NZ Transport Agency.

- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental education research*, 8(3), 239-260.
- Krizek, K. J., Forsyth, A., & Baum, L. (2009). *Walking and Cycling International Literature Review*. Melbourne, Australia.
- Krizek, K. J., Johnson, P. J., & Tilahun, N. (2005). Gender differences in bicycling behavior and facility preferences. *Research on Women's Issues in Transportation*, 2, 31-40.
- Krueger, R. A., & Casey, M. A. (2009). *Focus groups: A practical guide for applied research*. London, UK: Sage.
- Lajunen, T., & Räsänen, M. (2004). Can social psychological models be used to promote bicycle helmet use among teenagers? A comparison of the Health Belief Model, Theory of Planned Behavior and the Locus of Control. *Journal of Safety Research*, 35(1), 115-123.
- Land Transport New Zealand. (2006). *Sustainable and safe land transport - Trends and Indicators*. Retrieved from <http://www.cycle-helmets.com/nz-ltsa-2006.pdf> [Accessed 24/08/2015]
- Larsen, K., Gilliland, J., Hess, P., Tucker, P., Irwin, J., & He, M. (2009). The influence of the physical environment and sociodemographic characteristics on children's mode of travel to and from school. *American Journal of Public Health*, 99(3), 520.
- Leeuw, D. (2008). Self-Administered Questionnaires and Standardized Interviews. In P. Alasuutari, L. Bickman & J. Brannen (Eds.), *The Sage Handbook of Social Research Methods* (pp. 313-327). London: SAGE.
- Leslie, E., Kremer, P., Toumbourou, J. W., & Williams, J. W. (2010). Gender differences in personal, social and environmental influences on active travel to and from school for Australian adolescents. *Journal of Science and Medicine in Sport*, 13(6), 597-601.
- Leyden, K. M. (2003). Social capital and the built environment: The importance of walkable neighborhoods. *American Journal of Public Health*, 93(9), 1546-1551.
- Litman, T. (2015). The future isn't what it used to be: Changing trends and their implications for transport planning (pp. 1-44). Victoria, Canada: Victoria Transport Policy Institute.
- Lorenc, T., Brunton, G., Oliver, S., Oliver, K., & Oakley, A. (2008). Attitudes to walking and cycling among children, young people and parents: A systematic review. *Journal of Epidemiology and Community Health*, 62(10), 852-857.
- Luke, A., & Cooper, R. S. (2013). Physical activity does not influence obesity risk: time to clarify the public health message. *International journal of epidemiology*, 42(6), 1831-1836.
- Mackie, H. (2010). *Improving school travel systems. Research report 420*. (0478371071). Wellington: NZ Transport Agency
- Manning, M. (2009). The effects of subjective norms on behaviour in the theory of planned behaviour: A meta analysis. *British Journal of Social Psychology*, 48(4), 649-705.
- Manning, M., & Allen, M. (1987). Social development in early adolescence: Implications for middle school educators. *Childhood Education*, 63(3), 172-176.
- Martin, S. L., Lee, S. M., & Lowry, R. (2007). National prevalence and correlates of walking and bicycling to school. *American journal of preventive medicine*, 33(2), 98-105.
- Matthews, M. H. (1987). Gender, home range and environmental cognition. *Transactions of the institute of British Geographers*, 12, 43-56.
- Matthews, M. H. (1992). *Making sense of place: Children's understanding of large-scale environments*. New York: Barnes & Noble Books.
- Mayes, M., Halliday, M., & Hatch, O. (1996). *A qualitative assessment of attitudes to cycling the UK* Paper presented at the Transport policy and its implementation. Proceedings of Seminar B held at the 24th European Transport Forum Brunei University, England.
- McDonald, N. (2007). Active transportation to school: Trends among US schoolchildren, 1969-2001. *American Journal of Preventive Medicine*, 32(6), 509-516.
- McDonald, N. (2008). Children's mode choice for the school trip: The role of distance and school location in walking to school. *Transportation*, 35(1), 23-35.

- McDonald, N. (2012). Is there a gender gap in school travel? An examination of US children and adolescents. *Journal of Transport Geography*, 20(1), 80-86.
- McDonald, N., Brown, A. L., Marchetti, L. M., & Pedroso, M. S. (2011). US school travel, 2009: An assessment of trends. *American Journal of Preventive Medicine*, 41(2), 146-151.
- McDonald, N., Deakin, E., & Aalborg, A. E. (2010). Influence of the social environment on children's school travel. *Preventive medicine*, 50, S65-S68.
- McKenzie-Mohr, D. (2011). *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing*. New York: New Society Publishers.
- McLean, R. M., Hoek, J. A., Buckley, S., Croxson, B., Cumming, J., Ehau, T. H., . . . Schofield, G. (2009). "Healthy Eating--Healthy Action": Evaluating New Zealand's obesity prevention strategy. [Article]. *BMC Public Health*, 9, 452-459.
- McMillan, T. E. (2007). The relative influence of urban form on a child's travel mode to school. *Transportation Research Part A: Policy and Practice*, 41(1), 69-79.
- McMillan, T. E., Day, K., Boarnet, M., Alfonzo, M., & Anderson, C. (2006). Johnny walks to school - does Jane? Sex differences in children's active travel to school. *Children Youth and Environments*, 16(1), 75-89.
- Miech, R. A., & Hauser, R. M. (2001). Socioeconomic status and health at midlife: A comparison of educational attainment with occupation-based indicators. *Annals of Epidemiology*, 11(2), 75-84.
- Millard-Ball, A., & Schipper, L. (2011). Are we reaching peak travel? Trends in passenger transport in eight industrialized countries. *Transport Reviews*, 31(3), 357-378.
- Ministry of Education. (2013). *Shaping Education - Future Direction. Te Tareinga Matauranga. Opportunity plus innovation to enhance education outcomes across greater Christchurch*. Retrieved from <http://shapededucation.govt.nz/> [Accessed 8/06/2015]
- Ministry of Education. (2015). *School deciles*. Retrieved from <http://www.education.govt.nz/school/running-a-school/resourcing/operational-funding/school-decile-ratings/> [Accessed 24/08/2015]
- Ministry of Health. (2015). *Understanding excess body weight: New Zealand Health Survey*. Retrieved from <http://www.health.govt.nz/publication/understanding-excess-body-weight-new-zealand-health-survey> [Accessed 5/5/2015]
- Ministry of Transport. (2013a). *Comparing travel modes. New Zealand Household Travel Survey 2009-2013*. Retrieved from <http://www.transport.govt.nz/assets/Import/Documents/Cycling-2013.pdf> [Accessed 9/06/2015]
- Ministry of Transport. (2013b). *Cycling for transport Household Travel Survey*. Retrieved from http://www.transport.govt.nz/research/Documents/Comparingtravelmodes_2009.pdf [Accessed 9/06/2015]
- Ministry of Transport. (2015). *Comparing travel modes. New Zealand Household Travel Survey 2001-2014* (pp. 32). Wellington: Ministry of Transport.
- Ministry of Transport. (2016). *Climate change and energy*. Retrieved from <http://www.transport.govt.nz/ourwork/climatechange/> [Accessed 8/3/16]
- Ministry of Transport Public Works and Water Management. (2010). *Public Transport in the Netherlands*. Retrieved from www.emta.com/IMG/pdf/brochure.pdf [Accessed 10/12/2014]
- Mitchell, H., Kearns, R. A., & Collins, D. C. A. (2007). Nuances of neighbourhood: Children's perceptions of the space between home and school in Auckland, New Zealand. *Geoforum*, 38(4), 614-627.
- Mitra, R., & Buliung, R. N. (2015). Exploring differences in school travel mode choice behaviour between children and youth. *Transport Policy*, 42, 4-11.
- Mori, N., Armada, F., & Willcox, D. C. (2012). Walking to school in Japan and childhood obesity prevention: new lessons from an old policy. *American journal of public health*, 102(11), 2068-2073.

- Motor Accident Commission, & Government of South Australia. (2014). *Lose your licence and you're screwed*. Retrieved from <http://www.youtube.com/watch?v=J8lZT-L1ARo> [Accessed 14/10/14]
- Mullan, E. (2014). *Drivers, teenagers, danger and tolerance: views from Ireland*. Paper presented at the Cycling and Society Symposium Newcastle, UK.
- My Dutch bike. (2015). *What is a Dutch bike?* Retrieved from <http://www.mydutchbike.com/2011/02/23/what-is-a-dutch-bike/> [Accessed 29/07/2015]
- Nankervis, M. (1999). The effect of weather and climate on bicycle commuting. *Transportation Research Part A: Policy and Practice*, 33(6), 417-431.
- Nelson, N. M., Foley, E., O'Gorman, D. J., Moyna, N. M., & Woods, C. B. (2008). Active commuting to school: How far is too far? *International Journal of Behavioral Nutrition and Physical Activity*, 5(1), 1.
- New Zealand Transport Agency. *Share the road advertising*. Retrieved from <https://www.nzta.govt.nz/safety/driving-safely/sharing-the-road/share-the-road-advertising/> [Accessed 28/07/2015]
- New Zealand Transport Agency. (2014). *Safer journeys for schools: Guidelines for school communities*. Wellington, NZ.
- New Zealand Transport Agency. (2015a). *Be bright be seen*. Retrieved from <https://www.bikewise.co.nz/events/2015/03/27/be-bright-be-seen> [Accessed 28/07/2015]
- New Zealand Transport Agency. (2015b). *Road Death Statistics*. Retrieved from <http://www.nzta.govt.nz/resources/road-deaths/toll.html> [Accessed 5/05/2015]
- Nicholson, A., & Kingham, S. (2003). *The University of Canterbury Transport Strategy*. Paper presented at the 26th Australian Transport Research Forum, Wellington, NZ.
- Norris, J. (2014). Cyclists need safer city roads, *The Press, Christchurch*.
- O'Rourke, P. J. (1987). A cool and logical analysis of the bicycle menace and an examination of the actions necessary to license, regulate, or abolish entirely this dreadful peril on our roads. *The Atlantic Monthly Press*.
- Orsini, A. F. (2005). *Fun, fast and fit: Influences and Motivators for Teenagers who Cycle to High School*. Master of Arts in Environmental Education and Communication Masters, Royal Roads University, Victoria, Canada. Retrieved from <http://www.collectionscanada.gc.ca/obj/thesescanada/vol2/002/mr09422.pdf>
- Orsini, A. F. (2012). *Engaging teens in healthy transport decisions*. Paper presented at the Adolescent Mobility Health Consortium Symposium 2012. , Dunedin, New Zealand.
- Osborne, P. (2001). *Better health and safety through safe routes to schools*. Paper presented at the European Conference on Mobility Management (ECOMM), Rome, Italy.
- Panter, J. R., Jones, A. P., Van Sluijs, E. M., & Griffin, S. J. (2010). Neighborhood, route, and school environments and children's active commuting. *American journal of preventive medicine*, 38(3), 268-278.
- Panter, J. R., Jones, A. P., van Sluijs, E. M. F., & Griffin, S. J. (2009). Attitudes, social support and environmental perceptions as predictors of active commuting behaviour in school children. *Journal of Epidemiology and Community Health*, 64(01), 41-48.
- Park, H. S., & Smith, S. W. (2007). Distinctiveness and influence of subjective norms, personal descriptive and injunctive norms, and societal descriptive and injunctive norms on behavioral intent: A case of two behaviors critical to organ donation. *Human Communication Research*, 33(2), 194-218.
- Parkin, J., Ryley, T., & Jones, T. (2007). Barriers to Cycling: An Exploration of Quantitative Analyses. In D. Horton, P. Rosen & P. Cox (Eds.), *Cycling and society* (pp. 67-82). London: Ashgate.
- Paskins, J. (2005). *Are differences in children's travel reflected in their cognitive maps?* Paper presented at the International Conference of Traffic and Transport Psychology, Nottingham, England.

- Penalosa, A. (2011). *Representation of urban cycling in media: A case study of London before and after the launch of the Cycle Hire Program*. MSc in Media Communication and Development, London School of Economics, London.
- Pikora, T., Giles-Corti, B., Bull, F., Jamrozik, K., & Donovan, R. (2003). Developing a framework for assessment of the environmental determinants of walking and cycling. *Social Science & Medicine*, 56(8), 1693-1703.
- Pooley, C. G., & Jones, T. (2013). *Promoting walking and cycling*. UK: Policy Press.
- Pooley, C. G., Turnbull, J., & Adams, M. (2005). The journey to school in Britain since the 1940s: Continuity and change. *Area*, 37(1), 43-53.
- Prezza, M., Pilloni, S., Morabito, C., Sersante, C., Alparone, F. R., & Giuliani, M. V. (2001). The influence of psychosocial and environmental factors on children's independent mobility and relationship to peer frequentation. *Journal of Community & Applied Social Psychology*, 11(6), 435-450.
- Prochaska, J. O., & DiClemente, C. C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research & Practice*, 19(3), 276.
- Psychology Dictionary. (2014). *What is prototype?* Retrieved from <http://psychologydictionary.org/prototype> [Accessed 12/12/2014]
- Pucher, J., & Buehler, R. (2008). Making cycling irresistible: Lessons from the Netherlands, Denmark and Germany. *Transport Reviews*, 28(4), 495-528.
- Pucher, J., & Dijkstra, L. (2003). Promoting safe walking and cycling to improve public health: Lessons from the Netherlands and Germany. *American Journal of Public Health*, 93(9), 1509-1516.
- Resnik, D. (2011). *What is ethics in research and why is it important?* Retrieved from <http://www.niehs.nih.gov/research/resources/bioethics/whatis> [Accessed 11/12/2014]
- Rice, B. (2008). *How we got to school: A study of travel choices of Christchurch primary school pupils*. Master of Engineering (Transportation), University of Canterbury, Christchurch.
- Rietveld, P. (2000). The accessibility of railway stations: The role of the bicycle in The Netherlands. *Transportation Research Part D: Transport and Environment*, 5(1), 71-75.
- Rietveld, P., & Daniel, V. (2004). Determinants of bicycle use: Do municipal policies matter? *Transportation Research Part A: Policy and Practice*, 38(7), 531-550.
- Rimano, A., Piccini, M. P., Passafaro, P., Metastasio, R., Chiarolanza, C., Boison, A., & Costa, F. (2015). The bicycle and the dream of a sustainable city: An explorative comparison of the image of bicycles in the mass-media and the general public. *Transportation Research Part F: Traffic Psychology and Behaviour*, 30(0), 30-44.
- Rissel, C., Campbell, F., Ashley, B., & Jackson, L. (2002). Driver road rule knowledge and attitudes towards cyclists. *Australian Journal of Primary Health*, 8(2), 66-69.
- Rissel, C., & Wen, L. M. (2011). The possible effect on frequency of cycling if mandatory bicycle helmet legislation was repealed in Sydney, Australia: A cross sectional survey. *Health promotion journal of Australia*, 22(3), 178-183.
- Ritchie, J., & Lewis, J. (2003). *Qualitative research practice: A guide for social science students and researchers*. London: Sage Publications.
- Rivis, A., Sheeran, P., & Armitage, C. J. (2006). Augmenting the theory of planned behaviour with the prototype/willingness model: Predictive validity of actor versus abstainer prototypes for adolescents' health-protective and health-risk intentions. *British Journal of Health Psychology*, 11(3), 483-500.
- Rodríguez, D. A., & Joo, J. (2004). The relationship between non-motorized mode choice and the local physical environment. *Transportation Research Part D: Transport and Environment*, 9(2), 151-173.
- Saelens, B. E., & Handy, S. L. (2008). Built environment correlates of walking: A review. *Medicine and science in sports and exercise*, 40(7 Supplement 1), S550-S566.
- Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annu. Rev. Public Health*, 27, 297-322.

- Sallis, J. F., Owen, N., & Fisher, E. B. (2008). Ecological models of health behavior. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (pp. 465-486). San Francisco: Jossey-Bass.
- Sankaran, J. K., Gore, A., & Coldwell, B. (2005). The impact of road traffic congestion on supply chains: Insights from Auckland, New Zealand. *International Journal of Logistics: Research and Applications*, 8(2), 159-180.
- Schlossberg, M., Greene, J., Phillips, P. P., Johnson, B., & Parker, B. (2006). School trips: Effects of urban form and distance on travel mode. *Journal of the American Planning Association*, 72(3), 337-346.
- Schoeffel, P., Meleisea, M., David, R., Kalauni, R., Kalolo, K., Kingi, P., & Williams, S. (1996). Pacific Islands Polynesian attitudes to child training and discipline in New Zealand: Some policy implications for social welfare and education. *Social Policy Journal of New Zealand*, 6, 134-147.
- Schwanen, T. (2011). Car use and gender: The case of dual-earner families in Utrecht, The Netherlands. In K. Lucas, E. Blumenberg & R. Weinberger (Eds.), *Auto Motives: Understanding Car Use Behaviors*. UK: Emerald Group Publishing.
- Shafizadeh, K., & Niemeier, D. (1997). Bicycle journey-to-work: travel behavior characteristics and spatial attributes. *Transportation Research Record: Journal of the Transportation Research Board*, 1578(1), 84-90.
- Sheller, M. (2004). Automotive emotions feeling the car. *Theory, culture & society*, 21(4-5), 221-242.
- Simmons, R. G., & Blyth, D. A. (1987). *Moving into adolescence: The impact of pubertal change and school context*. Chicago: AldineTransaction.
- Simon, H. A. (1957). Models of man; social and rational.
- Sirard, J. R., & Slater, M. E. (2008). Walking and bicycling to school: A review. *American Journal of Lifestyle Medicine*, 2(5), 372-396.
- Skinner, R., & Rosen, P. (2007). Hell is other cyclists: Rethinking Transport and Identity. In D. Horton, P. Rosen & P. Cox (Eds.), *Cycling and society* (pp. 83-96). Aldershot: Ashgate.
- Sloman, L. (2006). *Car sick - Solutions for our Car-addicted Culture*. Bodmin, Cornwall, UK: MPG Books.
- Smith, P., Wilson, M., & Armstrong, T. (2011). 'I'll just take the car'. *Improving bicycle transportation to encourage its use on short trips*. (426). Wellington: New Zealand Transport Agency.
- Smithson, J. (2008). Focus Groups. In P. Alasuutari, L. Bickman & J. Brannen (Eds.), *The Sage Handbook of Social Research Methods* (pp. 357-370). London: SAGE.
- Somers, P., & Stone, J. (2015). *School transport: An important consideration in the wider transport context: A comparison of Zurich, Munich and Melbourne*. Paper presented at the Australian Institute of Traffic Planning and Management (AITPM) National Conference, , Brisbane, Queensland, Australia.
- Spijkerman, R., van den Eijnden, R. J., Vitale, S., & Engels, R. C. (2004). Explaining adolescents' smoking and drinking behavior: The concept of smoker and drinker prototypes in relation to variables of the theory of planned behavior. *Addictive behaviors*, 29(8), 1615-1622.
- Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate? *Behavioral and Brain Sciences*, 23, 645-665.
- Statistics New Zealand. (2014a). *Main means of travel to work by age group, for the employed census usually resident population count aged 15 years and over, 2001, 2006, and 2013 Censuses (RC, TA)*. Retrieved from <http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE8182> [Accessed 20/05/2015]
- Statistics New Zealand. (2014b). *New Zealand in the OECD*. Retrieved from http://www.stats.govt.nz/browse_for_stats/government_finance/central_government/nz-in-the-oecd/population.aspx [Accessed 1-/12/2014]

- Steer Davies Gleave and the Association for Commuter Transport. (2000). *A travel plan resources pack for employers*. Harwell, UK: Energy Efficiency Best Practice Programme Retrieved from <http://webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/pgr/sustainable/travelplans/work/resourcepackemployers/> [Accessed 10/9/2104].
- Steinbach, R., Green, J., Datta, J., & Edwards, P. (2011). Cycling and the city: A case study of how gendered, ethnic and class identities can shape healthy transport choices. *Social Science & Medicine*, 72(7), 1123-1130.
- Stevenson, A., Banwell, K., & Pink, R. (2006). Assessing the impacts on health of an urban development strategy: A case study of the Greater Christchurch Urban Development Strategy. *Social Policy Journal of New Zealand*, 29, 146.
- Stewart, A., & Gates, C. (2014). Where folk talk through crack in door, *The Press, Christchurch*.
- Stokes, G. (2013). *Gordon Stokes Transport. The idea of peak car*. Retrieved from <http://www.gordonstokes.co.uk/transport/peakcar.html> [Accessed 11/08/2015]
- Stokes, G., & Hallett, S. (1992). The role of advertising and the car. *Transport Reviews*, 12(2), 171-183.
- Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. *The social psychology of intergroup relations*, 33(47), 74.
- Tal, G., & Handy, S. (2008). Children's biking for non-school purposes: Getting to soccer games in Davis, California. *Transportation Research Record: Journal of the Transportation Research Board*(2074), 40-45.
- Taylor, M., & Scuffham, P. (2002). New Zealand bicycle helmet law—do the costs outweigh the benefits? *Injury Prevention*, 8(4), 317-320.
- Terry, D. J., Hogg, M. A., & McKimmie, B. M. (2015). Attitude-behaviour relations: The role of in-group norms and mode of behavioural decision-making. *British Journal of Social Psychology*, 39(3), 337-361.
- Thompson, D., & Wolf, A. M. (2001). The medical-care cost burden of obesity. *Obesity Reviews*, 2(3), 189-197. doi: 10.1046/j.1467-789x.2001.00037.x
- Thornton, A., Bunt, K., Dalziel, D., & Simon, A. (2010). *Climate Change and Transport Choices, Segmentation Study - Interim Report by TNZ-BMRB*. UK.
- Timperio, A., Ball, K., Salmon, J., Roberts, R., Giles-Corti, B., Simmons, D., . . . Crawford, D. (2006). Personal, family, social, and environmental correlates of active commuting to school. *American Journal of Preventive Medicine*, 30(1), 45-51.
- Timperio, A., Crawford, D., Telford, A., & Salmon, J. (2004). Perceptions about the local neighborhood and walking and cycling among children. *Preventive medicine*, 38(1), 39-47.
- Tin Tin, S., Woodward, A., Thornley, S., & Ameratunga, S. (2009). Cycling and walking to work in New Zealand, 1991-2006: Regional and individual differences, and pointers to effective interventions. *International Journal of Behavioral Nutrition and Physical Activity*, 6, 64.
- Tranter, P. (2012). *The Urban Speed Paradox. Youth perspectives on time pressure, transport and health*. Paper presented at the Adolescent Mobility Health Consortium Symposium 2012. , Dunedin, New Zealand.
- Tranter, P., & Pawson, E. (2001). Children's Access to Local Environments: A case-study of Christchurch, New Zealand. *Local Environment*, 6(1), 27-48.
- Tranter, P., & Sharpe, S. (2012). Disney-Pixar to the rescue: Harnessing positive affect for enhancing children's active mobility. *Journal of Transport Geography*.
- Triandis, H. C. (1979). *Values, attitudes, and interpersonal behavior*. Paper presented at the Nebraska symposium on motivation, Nebraska, USA.
- Tudor-Locke, C., Ainsworth, B. E., & Popkin, B. M. (2001). Active commuting to school. *Sports Medicine*, 31(5), 309-313.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124-1131.

- Underwood, S. K., Handy, S. L., Paterniti, D. A., & Lee, A. E. (2014). Why do teens abandon bicycling? A retrospective look at attitudes and behaviors. *Journal of Transport & Health*, 17-24.
- Unicef. (2011). *Convention on the Rights of the Child*. Retrieved from <http://www.unicef.org/crc/> [Accessed 20/09/2015]
- United Nations. (1989). *Convention on the Rights of the Child*. Retrieved from <http://www.ohchr.org/en/professionalinterest/pages/crc.aspx> [Accessed 16/07/2015]
- United States Environmental Protection Agency. (2016). *Global Greenhouse Gas Emissions Data*. Retrieved from <http://www3.epa.gov/climatechange/ghgemissions/global.html> [Accessed 7/3/16]
- University of Canterbury. (2014). *Human Ethics*. Retrieved from <http://www.canterbury.ac.nz/humanethics/> [Accessed 12/12/2014]
- Urry, J. (2000). *Sociology beyond societies: Mobilities for the twenty-first century*. London: Routledge.
- Valentine, G. (2005). Tell me about...: Using interviews as a research methodology. In R. Flowerdew & D. Martin (Eds.), *Methods in human geography: a guide for students doing a research project* (pp. 110-127). New York: Prentice Hall.
- Valentine, G., & McKendrick, J. (1997). Children's outdoor play: Exploring parental concerns about children's safety and the changing nature of childhood. *Geoforum*, 28(2), 219-235.
- Van der Kloof, A. (2015). Lessons learned through training immigrant women in the Netherlands to cycle. In P. Cox (Ed.), *Cycling Cultures*. Chester: University of Chester Press.
- van der Ploeg, H. P., Merom, D., Corpuz, G., & Bauman, A. E. (2008). Trends in Australian children traveling to school 1971-2003: Burning petrol or carbohydrates? *Preventive medicine*, 46(1), 60-62.
- Van Dyck, D., Cardon, G., Deforche, B., & De Bourdeaudhuij, I. (2009). Lower neighbourhood walkability and longer distance to school are related to physical activity in Belgian adolescents. *Preventive medicine*, 48(6), 516-518.
- Varma, S. R. (2014). *Mean Girls (2004) Plot summary*. Retrieved from <http://www.imdb.com/title/tt0377092/plotsummary>. [Accessed 10/12/2014]
- Victoria Transport Policy Institute. (2014). *Roadway Connectivity: Creating More Connected Roadway and Pathway Network*. Retrieved from <http://www.vtpi.org/tdm/tdm116.htm> [Accessed 17/03/2015]
- Victorian Government. (2014). *Road use or road abuse*. Retrieved from <https://www.youtube.com/watch?v=auIhCslvcA&feature=youtu.be>. [Accessed 26/06/15]
- Villanueva, K., Giles-Corti, B., Bulsara, M., Timperio, A., McCormack, G., Beesley, B., . . . Middleton, N. (2012). Where do Children Travel to and What Local Opportunities Are Available? The Relationship Between Neighborhood Destinations and Children's Independent Mobility. *Environment and Behavior*, 45(6), 679-705.
- Voukelatos, A., & Rissel, C. (2010). The effects of bicycle helmet legislation on cycling-related injury: The ratio of head to arm injuries over time. *Australasian College of Road Safety*, 21(3), 50-55.
- Walton, D. (2011). Email to J. FRATER re. my PhD, 2 June 2011.
- Wardman, M., Tight, M., & Page, M. (2007). Factors influencing the propensity to cycle to work. *Transportation Research Part A: Policy and Practice*, 41(4), 339-350.
- WeatherOnline. (2014). *The Netherlands*. Retrieved from <http://www.weatheronline.co.nz/reports/climate/The-Netherlands.htm> [Accessed 10/12/2014]
- Weigand, L. (2008). A review of literature: The effectiveness of safe routes to school and other programs to promote active transportation to school. *Initiative for Bicycle and Pedestrian Innovation*. Portland: Center for Transportation Studies, Portland State University.
- Weller, S., & Bruegel, I. (2009). Children's Place in the Development of Neighbourhood Social Capital. *Urban Studies*, 46(3), 629-643.

- Wen, L. M., Fry, D., Rissel, C., Dirkis, H., Balafas, A., & Merom, D. (2008). Factors associated with children being driven to school: implications for walk to school programs. *Health education research*, 23(2), 325-334.
- Williams, A., & Bedward, J. (2002). Understanding girls' experience of physical education: Relational analysis and situated learning. In D. Penny (Ed.), *Gender and physical education: Contemporary issues and future directions* (pp. 146-159). London: Taylor and Francis.
- Williams, P., Pocock, B., & Bridge, K. (2009). Kids' lives in adult space and time: How home, community, school and adult work affect opportunity for teenagers in suburban Australia. *Health sociology review*, 18(1), 79-93.
- Wilson, E. J., Marshall, J., Wilson, R., & Krizek, K. J. (2010). By foot, bus or car: Children's school travel and school choice policy. *Environment and Planning A*, 42(9), 2168-2185.
- Winter, J. (2004). Cruel Intentions: Loser Teens Burst Alpha Girls' Plastic Bubble. *The Village Voice*.
- Wiseman, R. (2002). *Queen Bees and Wannabes: Helping Your Daughter Survive Cliques, Gossip, Boyfriends, and Other Realities of Adolescence*. London: Piatkus.
- Witten, K., Kearns, R., Lewis, N., Coster, H., & McCreanor, T. (2003). Educational restructuring from a community viewpoint: A case study of school closure from Invercargill, New Zealand. *Environment and Planning C*, 21(2), 203-224.
- World Health Organisation. (2000). Transport, environment and health. Copenhagen: WHO Regional Publications, European Series, No. 89.
- World Health Organisation. (2015a). *Global Health Observatory (GHO) data*. Retrieved from http://www.who.int/gho/ncd/risk_factors/overweight/en/ [Accessed 5/5/2015]
- World Health Organisation. (2015b). *Obesity and overweight*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en/> [Accessed 10/08/2015]
- Yelavich, S., Towns, C., Burt, R., Chow, K., Donohue, R., Sani, H., . . . Reeder, A. I. (2008). Walking to school: Frequency and predictors among primary school children in Dunedin, New Zealand. *New Zealand medical journal*, 121(1271), 51-58.
- Youniss, J., & Haynie, D. L. (1992). Friendship in adolescence. *Journal of Developmental & Behavioral Pediatrics*, 13(1), 59-66.
- Zimmermann, F., & Sieverding, M. (2010). Young adults' social drinking as explained by an augmented theory of planned behaviour: The roles of prototypes, willingness, and gender. *British Journal of Health Psychology*, 15(3), 561-581.